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DISEASES CAUSED BY BACTERIA AND FUNGI.

REED, Guildford B., & RICE, Christine E. (1931). **Studies in the Variability of Tubercle Bacilli.** II. Correlation of Colony Structure, Acid Agglutination and Virulence.—*Canad. J. Res.* 5. 111-121. 34 text figs. 1 table. [24 refs.]

REED, Guildford B., & RICE, Christine E. (1931). **Studies in the Variability of Tubercle Bacilli.** III. Influence of X-rays upon Dissociation.—*Ibid.* 5. 122-129. 5 tables. [25 refs.]

[NOTE.—For the first of this series of papers see this *Bulletin*. 1. 189.]

The authors have studied a number of human, bovine and avian cultures of *B. tuberculosis*, particularly with regard to colony structure, virulence and the pH concentration necessary to bring about acid agglutination. From the results obtained, they conclude that the S colony type of PETROFF is the virulent pathogen, needing a more acid reaction for agglutination than the R type which is avirulent. They were unable to connect the pH of acid agglutination with the variations in virulence of the types for different animals.

The exposure of a rapidly growing bovine strain to X-ray treatment had little effect on stable R colonies, but it assisted the dissociation of less stable R forms into R and S colonies. Large doses of X-ray were found to be lethal, although non-acid-fast organisms were not appreciably affected. The addition of colloids to the material to be irradiated afforded some protection.

HERROLD, Russell D. (1931). **Egg Yolk Agar Medium for the Growth of Tubercle Bacilli.**—*J. Infect. Dis.* 48. 236-241. [3 refs.]

The author recommends the use of 15 per cent. egg yolk in 1 per cent. nutrient agar for the isolation of *B. tuberculosis*. He obtained a macroscopic growth from tuberculous urine after 10 days incubation at 34°—36°C. and considers that the method is as delicate as the inoculation of guinea pigs and yields quicker results. He describes the growth of other organisms on this medium and the effect of certain acid modifications upon their growth and upon that of *B. tuberculosis*. He points out that the yolk is the essential basis in egg media, the white being bacteriostatic, if not bactericidal in its action.

GRIFFITH, A. S. (1931). **Chronic Infection of the Udder of a Goat with Avian Tubercle Bacilli.**—*J. Comp. Path. & Therap.* 44. 143-148.

The author gives an account of a nanny goat which had been inoculated subcutaneously on 10th March, 1926, with 100 mg. of avian tubercle bacilli. A large slough developed at the site of inoculation. At intervals of several months, pus was obtained first from the prescapular and later from the precrural glands. Tubercle bacilli could be found by microscopical examination, but cultures remained sterile.

A dead kid was delivered in January, 1927, but on examination no evidence of tuberculosis could be found.

In March, 1928, two more kids were born, but one of these died as the result of an accident. The other was reared with difficulty and was killed when 120 days old ; no evidence of tuberculosis was found on *post-mortem* examination. Two tests carried out on the surviving kid with avian tuberculin yielded negative results, while the nanny goat reacted strongly.

In March, 1930, two more kids were born and both survived. Neither reacted to avian tuberculin ; one of them was free from tuberculosis when killed and examined eight months later.

The nanny goat was known to have passed avian bacilli with the milk. It is thus apparent that small doses of avian bacilli by the mouth fail to cause infection, but that large doses of culture are capable of infecting by ingestion.

Repeated tests have shown that avian tubercle bacilli have maintained themselves in the right half of the udder of the nanny goat for four and a half years. The secretion from the left half has always given negative results. Tubercle bacilli were always present in large numbers in the pus-like fluid obtainable from the right half of the udder at the end of the "dry" periods, but they were very scanty during the fifth or sixth months of lactation.

There is no clinical evidence of tuberculosis of the udder tissue.

The goat is being kept alive with the object of supplying answers to the following questions :—

- (1) How long will avian bacilli continue to live in the goat's udder ?
- (2) If the bacilli persist, will they eventually destroy the gland tissue ?
- (3) Does the avian bacillus retain its characters during long residence in the tissues of the goat ?

Events so far have shown that the characters are retained for at least five years.

BOYER, L., & PLACIDI, L. (1931). Réaction de Vernes-Resorcin et Tuberculoses bovines.

[The Vernes Resorcin Reaction in Bovine Tuberculosis].—*C.R. Soc. Biol. Paris.* 106. 833-834.

The authors performed the Vernes resorcin test on the serum of 300 cattle slaughtered at Marseilles. The serum was obtained from heart blood as early as possible during the dressing of the carcase. 124 of the samples of sera were taken from known tuberculous animals and the test reading figures were found to vary from below 10 (old calcified lesions) to over 100, a large majority having a figure above 30. The results were considered to be reliable and the authors consider that the test is, therefore, of value for the diagnosis of tuberculosis in cattle. Normal sera usually give a reaction reading of less than 20.

MATTHEWS, H. T. (1931). The Microscopical Examination of Milk for Tubercl Cell Groups.—

Vet. Rec. 11. 403-405. 8 figs. [4 refs.]

The author's object is to assist practitioners in the examination of samples of milk from single cows which are suspected to be suffering from tuberculous mastitis. The essence of the method is that the amount of time spent in searching a specimen with the microscope should not exceed five minutes as, according to the author, the majority of the bacilli are to be found in the cell groups contained in the sediment. Prolonged and rapid centrifuging is not required as the heavy cell-groups, together with the bacilli they contain, are deposited first. It is not worth while to examine the cream.

To aid the practitioner in recognising the particular type of cell group, the author gives coloured illustrations of the different kinds of groups showing those in which tubercle bacilli may be found and those in which they are not. He emphasises the fact that the possibility of mixed infections must not be overlooked. The low power objective should be used to search the films for the cell groups and only the groups thus detected should be subjected to closer examination with the immersion lens.

DOWNHAM, K. D. (1931). The Examination of Milk for the Presence of Tubercl Bacilli.—A

Comparison between the Cell Group Method and a Method for the Concentration of Tubercle Bacilli in Milk.—*Vet. Rec.* 11. 756-758. [5 refs.]

The author expresses agreement with MATTHEWS [*vide supra*] regarding the value of cell groups as an aid in the detection of tuberculous mastitis by microscopical examination; he also agrees that centrifugalisation need only be carried out for a short time.

A series of comparative tests were undertaken using the cell group method and the method of concentration described by DOUGLAS and MEANWELL [(1925). *Brit. J. Exp. Path.* 6. 203].

Comparing the times taken to detect tubercle bacilli in a series of 31 specimens, the author found that, using the concentration method, it was necessary to search between three and four times as long in comparison with the cell-group method; the latter can be carried out in 20 minutes, whereas the concentration method takes 5 or 6 hours.

TORY, H. M. (1931). Interim Report on *Bacillus Calmette-Guérin*.—*Canad. J. Res.* 4. 543-545.

This report deals with investigations carried out during the past five years by an Associate Committee on Tuberculosis appointed by the National Research Council (Canada) in 1925.

The Committee found that the BCG culture was of reduced virulence and pathogenicity and that these characters were relatively fixed as long as the organisms were maintained on bile potato medium, glycerinated potato or Sauton's medium.

They consider that, in order to maintain the fixed characters of the organisms, it is advisable to subculture them on bile potato medium at frequent intervals; the precise intervals have not yet been definitely ascertained. [CALMETTE and GUÉRIN recommend that the organisms should be returned to their bile potato medium at intervals of six months].

The Committee consider that the virulence of the organisms may be exalted by cultural means, but no details are given of the methods by which this can be achieved.

With regard to the important question of immunity, it was found that, when given parenterally, the vaccine conferred a certain degree of resistance as evidenced either by the absence of tuberculous lesions or by a reduction in the extent and rate of development in the lesions resulting from natural or artificial infection.

GERLACH, F. (1931). La vaccination préventive contre la tuberculose. [Preventive Vaccination against Tuberculosis].—*Bull. Off. internat. Epiz.* 5. 63-83.

There is some difference of opinion, based on a consideration of the conditions of immunity peculiar to this disease, as to whether it is possible to produce an active immunity against tuberculosis. It is almost universally acknowledged that actual infection is essential for the production of immunity and the author suggests that all future research on this question should aim at finding organisms, either of low virulence or so modified that, while still retaining their immunising properties, they are themselves harmless. They must be capable of living as long as possible in the inoculated animal since immunity continues only for as long as the organisms persist in the animal body.

Actually, at the present time, only two methods of vaccination call for consideration:—(1) vaccination with dead bacilli [LANGER], and (2) vaccination with BCG [CALMETTE and GUÉRIN].

Tests on the first method have shown that it produces no appreciable degree of immunity.

With regard to the second method, at the present time it is premature to form any definite opinion as to its immunising powers.

The author discusses in considerable detail the accidents to human beings at Lübeck and quotes the views expressed in this connection by BRUNO LANGE and LUDWIG LANGE.

The rest of the paper resolves itself into a discussion of the various points for and against the use of BCG. The author quotes the results obtained by various workers on this subject and ends by giving a résumé of his own views regarding the value of the vaccine.

LOKHOFF, D., & LEVITAN, I. K. (1931). Altérations anatomo-pathologiques chez les lapins vaccinés avec le BCG. [Pathological-Anatomical Changes in Rabbits vaccinated with

BCG].—Ann. Inst. Pasteur. **47.** 44-56. [1 ref.]

The authors describe three groups of experiments carried out to determine the effect of BCG vaccination on both healthy and tuberculous rabbits.

From their *post-mortem* and microscopical observations, they conclude that the vaccine is innocuous for healthy rabbits; any alterations which may be produced rapidly regress: the vaccine is not only harmless for tuberculous rabbits, but it exerts an inhibitory effect on the course of infection. Complete arrest of the tuberculous processes was not obtained, but treated animals were found to be less severely affected than were the controls.

The authors consider that a large number of experiments should be carried out to make an accurate estimate of the value of BCG injections into tuberculous animals.

JONESCU, P., & JONESCU, E. (1931). Beiträge zum Studium der Histogenese von Tuberkulomen "in vitro" durch Impfung mit Tuberkelbazillen (typus humanus) und Stamm B.C.G. (Calmette Guérin). [**Contributions to the Study of the Histogenesis of Tuberculomas in vitro by Inoculation with Human Tubercle Bacilli and with BCG.**].—*Folia haemat.* **44.** 1-19. 21 figs. [41 refs.]

After a review of previous work regarding the action of tubercle bacilli on tissue cultures, the authors describe their own investigations. They employed fowl plasma, rabbit heparin plasma, bone marrow extract and spleen tissue and describe in detail the manner in which the bacteria were inoculated into the cultures.

Sterile spleen-tissue cultures were prepared for control purposes and were observed along with those which had been inoculated.

The effects on spleen cultures inoculated with virulent tubercle bacilli were:—(1) a shortening in the life of the culture—death within 15 days—and (2) a failure to develop normally on the part of certain embryonic forms of cells.

This was ascribed to the strong toxic action of the organisms. Among the cellular reactions observed were an active migration and proliferation of mononuclears and a mobilisation of the reticular cells of the spleen tissue. Lymphocytes, on the other hand, were very susceptible to the poison and failed to develop into polyblasts.

The authors observed further that the epithelioid cells have their origin in monocytes and reticular cells. These cells are phagocytic; they hypertrophy and turn into amoeboid polyblasts or epithelioid cells. Giant cells develop out of the latter by a process of nuclear division unaccompanied by protoplasmic division. In some cases giant cells appeared to be formed by fusion of a group of epithelioid cells situated near to a bacillary colony.

Cultures inoculated with BCG react in a similar manner, but the organisms have practically no toxic effect, consequently, cellular degeneration and caseation are absent; the bacilli are phagocytosed within about 12 days (if the inoculum is small) and the cultures survive for at least 20 days.

BOES, J. (1931). Vaccination anti-tuberculeuse par le B.C.G. Etat actuel de la question. [**The present Position regarding Vaccination against Tuberculosis by means of BCG.**].—*Bull. Off. internat. Epiz.* **5.** 35-62, 217-223 & 254.

At the International Veterinary Congress, held in London in August, 1930, BCG was the subject of lengthy discussion. Some spoke favourably of the vaccine, others unfavourably, but the majority held that judgment should be suspended until further work had been carried out. The veterinary profession is not yet convinced that vaccination with BCG is efficacious, harmless and of real practical value.

The point of view of the veterinarian differs somewhat from that of the medical man. The aim of human medicine is to save valuable lives and it is beyond doubt that, to children born in contaminated surroundings, BCG does afford a degree of protection sufficient to enable them to resist infection. From the veterinary point of view the object of protection against tuberculosis is not so much the saving of individuals, as the elimination of the disease from herds and the reduction of farmers' losses. The demands made by the veterinarian are greater than those made by the practitioner of human medicine.

A method of protection against tuberculosis will be held effective by the veterinary profession only if it makes possible the elimination of the disease.

It was discovered by KOCH that a light infection enables an animal to resist super-infection and the object of all research into anti-tuberculous vaccination has been to produce this condition of resistance. This state of allergy must not be confused with the immunity produced by vaccination against other bacterial diseases. Immunity is an active resistance while "premunition" against tuberculosis is merely a condition of tolerance, of which an essential feature is the persistence of living organisms in symbiosis with the tissues of the animal body.

It is impossible to form any definite opinion at the present time regarding the duration of this persistence, but there are grounds for thinking that, in certain cases, the resistance conferred by the vaccination disappears rather quickly.

It is admitted that mass invasion may break down the resistance produced by premunition and also that premunition does not necessarily prevent virulent bacilli from entering the tissues, even though it may prevent them from producing lesions. It was recognition of the fact that premunition produces a condition of resistance which gradually declines that led the originators of the method to recommend annual revaccination; ASCOLI recommends that this be given twice annually. Some investigators doubt whether these repeated doses produce any reinforcement of the power of resistance. It is argued that the bacilli introduced in the course of revaccination are eliminated, as are virulent bacilli, if the animal is still in a condition of allergy. If, on the other hand, the power of resistance has already disappeared and the animal is in infected surroundings, virulent bacilli will have invaded the body and the freshly inoculated vaccinal bacilli will not find the conditions essential to their effective action. This possibly explains why the resistance of vaccinated animals appears to diminish with increasing age.

Tuberculosis is the one disease which attacks animals without intermission and, in this respect, it differs from those contagious bacterial diseases which occur as epizootics. It is capable of establishing mass infection which can overcome even the most fully developed immunity. Vaccination against tuberculosis should therefore induce a continuous immunity of practically unlimited solidity.

The condition of allergy produced by avirulent bacilli does not apparently confer such a degree of resistance.

It is for this reason that GUÉRIN changed his original opinion and stated that calves must be protected from infection for a month after vaccination. The rules for the maintenance of these calves are no doubt logical, but they are difficult to put into practice and the use of boiled milk and the withholding of colostrum have an adverse effect upon the animal's health. Severe as these conditions are, the author believes that they are not sufficiently rigorous. He believes that, contrary to the opinion expressed by GUÉRIN in London, mass infections do take place even in well managed herds and that it is not necessary for an animal to be in the last stages of tuberculous cachexia for it to excrete large numbers of bacilli. Tuberculous mastitis or bronchitis may be responsible for a sufficiently heavy infection to overcome the resistance produced by the vaccination.

Full precautions must be taken to detect animals that are excreting bacilli and every possible source of infection must be traced.

It is controversial whether the vaccine is harmless or not.

The majority of investigators have not succeeded in producing extensive lesions in laboratory animals even with large doses of the vaccine. Others hold that the vaccine is of low virulence but capable of producing tuberculous lesions which heal up and do not extend. Inoculation of material from such lesions does not set up infection.

According to some investigators the bacilli in the vaccine may recover their virulence. The author thinks that mistakes are accountable for those cases in which it is claimed that a return of virulence has been demonstrated.

There is, at the present time, no definite evidence to justify the view that BCG is dangerous either for human beings or for bovines. Boes expresses the opinion that any danger attached to the use of the vaccine is minimised because it is only employed in heavily infected areas.

The vaccine has not yet been tested on a sufficiently large scale in the various countries to justify the formation of a definite opinion regarding its practical value, although it is generally recognised that under favourable conditions it increases the resistance to infection.

The favourable results obtained by GUÉRIN between 1921 and 1927 have not been obtained by other investigators.

The author reviews the varying results obtained in different parts of the world and the various criticisms that have been levelled at the practical application of the vaccine. He summarises the factors which are favourable and unfavourable to the method as follows :—

FAVOURABLE FACTORS.

I. BCG vaccine can be employed in infected places without danger, without producing any adverse effect upon the animals' development or their normal economic use. Provided the vaccine is avirulent, inoculation of animals does not cause them to be a source of danger to human beings or animals.

II. When carried out under favourable conditions, the vaccination confers a certain resistance to superinfection which may assist prophylactic measures in infected places.

III. The method places a scientific means of attacking the disease in the hands of the veterinarian, allowing him easy intervention in infected places.

UNFAVOURABLE FACTORS.

I. Even when vaccination is practised, it is still necessary to impose precautions which are almost as difficult to carry out as those necessary to control the disease by the usual sanitary measures. The author is of the opinion that the initial measures laid down are insufficient to permit the full value to be obtained from the vaccination. They must be supplemented by unceasing supervision of the herd to prevent infection of the vaccinated animals by large doses of virulent material and to eliminate the virus from the premises.

II. The reaction of vaccinated animals to tuberculin undoubtedly prejudices their sale and export. This objection becomes less important if the vaccine is used only in heavily infected areas where animals will with certainty become reactors sooner or later.

III. There is some doubt as to the danger of introducing a vaccinated animal into a free herd. There is nothing to distinguish the vaccinated animal, which is free from active lesions, from the vaccinated animal which is actually infected. It is considered that it would be unwise to claim that vaccinated animals are harmless and to introduce them into clean herds.

The marking of vaccinated animals with the object of gaining some commerical advantage is thought to be premature.

In the discussion on the report those taking part were in general agreement that BCG is one of the means which may assist in the control of tuberculosis, but that it is not the only means of attaining this object.

BERGER pointed out that the marking of vaccinated animals does not necessarily mean that commercial advantage is sought. The marking of such animals is of value to purchasers who may wish to carry out tuberculin tests.

The Committee of the OFFICE INTERNATIONAL DES ÉPIZOOTIES associates itself with the conclusions of its reporters.

It expresses the opinion that, in the present state of our knowledge and with the means at our disposal, protection of animals against tuberculosis can be undertaken effectively with the collaboration of breeders. To this end, hygienic precautions and premunition will be combined in order to meet the varying conditions of stock raising.

The Committee is of the opinion that systematic prophylaxis of animal tuberculosis should be undertaken without delay in all countries, the individual results being collected together at once and brought to the knowledge of everyone.

- I. ANNOTATION. (1931). Friedmann's Turtle Vaccine.—*Lancet.* 221. 413-414.
- II. SAENZ, A. (1931). Etude expérimentale du bacille de la tortue constituant le vaccin dit préventif et curatif de la tuberculose de Friedmann. [Experimental Study of the Turtle Bacillus constituting the so-called Preventive and Curative Vaccine of Friedmann].—*Bull. Acad. Méd. Paris.* 105. 853-856.
- III. SAENZ, A. (1931). Sur le bacille paratuberculeux de la tortue. [On the Paratuberculosis

Bacillus of the Turtle].—*Ann. Inst. Pasteur.* 47. 4-28. 1 fig. 10 tables. [30 refs.]

I. A general note on the present status of Friedmann's vaccine indicating that it is unsatisfactory. Reference is made to the work of SAENZ, who has made a detailed study of the biological and other characters of the turtle bacillus.

II. This is the substance of a lecture given at a meeting of the Academy of Medicine, Paris. The matter is elaborated and published as reference III.

III. The author made a detailed examination of three strains of the turtle bacillus; two were obtained from Italy and the third was isolated from a standard ampoule of Friedmann's vaccine obtained through a commercial channel. The morphological and cultural characters are described in full and the bacillus is said to be similar to the acid-fast paratuberculosis bacteria which it also resembles in its pathogenic action on warm-blooded animals. Inoculation of cultures of the bacillus only causes small local lesions in guinea pigs and mice; while in frogs it causes gross lesions within a few weeks, the animals may survive for some months.

The antigenic action of the bacillus was tested by the method of BOQUET and NÈGRE; the results were positive, but very variable, and similar to those obtained with the timothy grass bacillus. [See ALEXA, E. (1928). *Ann. Inst. Pasteur.* 42. 1366-1402]. A paratuberculin was prepared from the turtle bacillus: it was found to be absolutely non-toxic for laboratory animals, but was of very little use for diagnostic purposes in guinea pigs infected with either the Friedmann vaccine or virulent tubercle bacilli.

The author carried out numerous experiments on guinea pigs to test the value of Friedmann's vaccine for immunisation purposes against infection with virulent tubercle bacilli. The vaccine had no protective effect even against minimal doses of infective material. Its curative properties were also nil.

NOWICKI, W., & PANEK, K. (1931). Histopathogénie de la Réaction provocatrice chez les Chevaux Morveux. [The Histopathogenesis of the "Provocative Reaction" in Glandered Horses].—*C.R. Soc. Biol. Paris.* 106. 851-854. [1 ref.]

For the "provocative test" described by Panek, a substance isolated from glanders bacilli which the authors call morvotensine is injected, and the reaction is really an exacerbation of the diseased condition. The typical reaction comprises two phases:—(1) the allergic phase and (2) the phase of provocation or re-infection.

The extensive application of this test in Poland has furnished ample material for the study of the changes occurring in glanders lesions following the injection of morvotensine. The material examined is divided into three groups:—(1) very recent lesions; (2) recent and older lesions and (3) very old lesions.

In animals that have been recently infected or that have a latent infection, the injection usually causes death as a result of generalisation with acute pneumonia.

Microscopical examination of lesions from such cases reveals the presence of an intense inflammatory reaction—generally of a serous or haemorrhagic character—in their neighbourhood, while existing necrotic centres become softened. Deep suppuration sometimes occurs at the places where morvotensine has been injected.

In animals belonging to the second group in which the disease is running a more or less chronic course, the reactions vary in severity with the extent of the lesions and the virulence of the bacilli in them. In these cases the reaction is definitely less severe, and death does not usually follow.

Microscopical examination of the lesions shows that a similar inflammatory reaction is present but that it is less extensive. In the case of old lesions which have become fibrous or calcified there is no evidence of any change.

In the third group are placed those cases in which lesions have been in existence and have healed, although there has never been any evidence of infection. Such lesions do not contain infective material either for guinea pigs or for horses. The injection of morvotensine into cases of this type causes only slight febrile and local reactions without any second phase. Microscopical examination does not show any inflammatory reaction in the neighbourhood of these lesions.

mission a l'homme. [Etiology and Prophylaxis of Brucella Diseases. *Br. abortus* and *Br. melitensis*. Transmission to Man].—Bull. Off. internat. Epiz. 5. 84-120, 223-228 & 255. 3 tables. 1 map. [1 ref.]

The author reviews briefly the history of the organisms causing undulant fever in man and contagious bovine abortion and refers to the discovery of their close relationship in 1918.

He gives some figures indicating the increase in the number of cases of human infection with *Br. abortus* in various countries and points out that, in the majority of cases, the diagnosis of infection with *Br. abortus* is based upon the results of serological tests. Special attention is directed to the occurrence of infection in veterinary surgeons. In these instances, infection usually takes place by inoculation.

The reason for the increase in the number of cases of human infection should be investigated. Possibly there is greater exposure to infection or susceptibility may have increased. Another explanation which has been suggested is that the organism may have acquired an increased virulence for man.

As the result of his own investigations, the author denies that it is possible to distinguish *Br. melitensis* from *Br. abortus*, but recent discoveries appear to have made possible such distinction. He considers that it is impossible to differentiate the organisms by means of the saturation of the agglutinins.

He concludes that the organisms infecting human beings, cattle and pigs are all varieties of the same species which have acquired special characters.

In spite of many investigations, it has not as yet been found possible to vaccinate goats successfully against *Br. melitensis*, so that the protection of human beings against infection from this source depends for the present upon the enforcement of hygienic measures. Human carriers of infection are a source of danger.

As infection with *Br. abortus* takes place in the majority of cases by inoculation, strict attention to protective measures and to disinfection is sufficient to protect those who run a severe risk of exposure.

Only a very small number of cases in human beings can be traced to the ingestion of infected milk. The organism is readily destroyed in milk by pasteurisation for half an hour at 60-63° C.

In Denmark and Sweden cases of infection in man with *Br. abortus* are notifiable. There is a close connection between the control of bovine abortion and cases of human infection.

Healthy herds can be protected against contagious abortion by making them self supporting, by purchasing only from abortion-free herds, by refraining from purchasing in-calf animals, by the frequent application of serological tests, by quarantine of newly purchased animals and by the use of bulls that are free from infection.

Herds which are only lightly affected can be cleaned up by the testing and elimination of reactors, but this method fails in heavily infected herds because it is not practicable to enforce the requisite measures completely. In heavily infected herds inoculation with living vaccine is employed. There do not appear to be any grounds for supposing that the use of live vaccine causes an increase in the number of animals which excrete the bacilli in the milk, as compared with the number of animals from which they are excreted as the result of natural infection. Medical opinion in Germany maintains that vaccination with live cultures should be replaced as soon as possible by some method which does not involve the use of living bacilli.

There is no doubt that a method of vaccination which, while reducing the number of abortions, maintains the existence of the disease, is not desirable and investigation of this aspect of the question on an international basis is an urgent necessity.

The author gives a map shewing the distribution of cases of infection with Bang's bacillus in human beings in Germany for the period 1st October, 1929, to 30th September, 1930.

In the course of the discussion the view was very generally expressed that the subject of infection of human beings requires the very closest study.

Communications from MADSEN and FINZI recorded the frequent occurrence of abortion in women in districts where bovine abortion is widespread and indicated that serum samples from these individuals reacted at high titres. Bacteriological examinations have not been carried out in these cases and it is admitted that serological tests are not sufficient to prove the exact nature of the infection.

The essence of a resolution adopted is as follows :—

The strains of brucella of human and animal origin are closely related.

The rigid application of suitable hygienic measures is effective for the control of bovine abortion. If rigid application of such measures is not practicable live vaccines must be used.

Live vaccine should be used only on heavily infected herds after the existence of the disease has been definitely determined by laboratory tests. Its use should be rigidly prohibited in all other circumstances.

The subject of the brucella diseases must be investigated internationally.

ANNOTATION. (1931). **Australasia. Undulant Fever in Australia.**—*Lancet.* 220. 668.
[2 refs.]

The first indigenous case of undulant fever to be recorded in New South Wales was that of a farmer, 51 years of age, who handled aborting cattle. The symptoms were typically those of undulant fever and the patient's serum agglutinated *Br. abortus* in dilutions of 1 : 640, but it did not agglutinate *Br. melitensis* in higher dilutions than 1 : 80.

JORDAN, Carl F. (1931). Infection in the Epidemiology of Undulant Fever in the General Population and in Selected Groups in Iowa.—*J. Infect. Dis.* 48. 526-540.

The sera of a group of the population of Iowa submitted for the Wasserman test was used ; 25 per cent. of the samples showed agglutinins for *Br. abortus* in titres of 1 : 5 to 1 : 20 and 3 per cent. at dilutions of 1 : 20 to 1 : 40. The agglutinins were considered to be due to the consumption of dairy produce.

The sera of veterinarians showed a slightly higher percentage of reactions at similar titres and this is attributed to their intimate contact with cattle.

The sera of employees in packing houses showed, in a number of instances, agglutinins in higher titre ; this was considered to be due to exposure to *Br. melitensis* infection through contact with porcine organisms.

Moussu, Raymond. (1931). Sur la prophylaxie et la pathogénie de l'avortement épizootique des Bovidés. [Prophylaxis and Pathogenesis of Bovine Infectious Abortion].—*Rec. Méd. vét.* 107. 336-342.

Vaccination with living cultures of *Br. abortus* has its adherents although many authorities condemn the method. Favourable and unfavourable reports have followed the use of inoculations with carbolic acid, methylene blue and killed vaccines as means of preventing or curing contagious abortion. The agglutination test is of little value because in some cases non-reacting animals abort and *Br. abortus* is recovered from the foetus ; in herds where abortions are unknown a high percentage of animals may react to the test.

The explanation of the epizootiology of contagious abortion, of the apparent success or failure of any particular treatment, of the incompatibility of the serological reactions and the clinical manifestations of the disease, is to be found in environmental conditions which influence the susceptibility of animals to *Br. abortus*. The microorganism is of low pathogenicity and only produces clinical disease when the resistance of the host is lowered by factors such as the season of the year, diet, age and the activities of the endocrine glands.

WILLIAM'S theory that *Br. abortus* is a mere secondary invader and not responsible for abortion is considered inadequate, because under certain conditions *Br. abortus* is capable of causing abortion.

BARKER, J. R. (1930). Are Present Methods of combatting Contagious Abortion effective ?—Vet. Rec. 10. 182.

The author questions the efficiency of the present methods of controlling contagious abortion. He discusses diagnosis by microscopical examination for the presence of *Br. abortus* in uterine

discharge and in the foetal membranes and by its isolation from the milk.

Judging from his remarks on the value of the agglutination test, he is apparently not conversant with the steady progress which is being made in America in the eradication of abortion by the employment of this test and the isolation of reactors.

McAULIFF, J. L. (1931). **The Practical Handling of Bang Abortion Disease.**—*Cornell Vet.* 21. 137-140.

Samples of sera taken from animals in a large dairy herd were tested for *Br. abortus* agglutinins. As a result of the test the herd was divided into two groups, one consisting of non-reacting and the other of reacting animals.

Repeated tests were carried out on the former group and any animals which reacted to the test were removed. By these means an abortion-free herd was obtained. Additions to the herd were made with non-reacting animals. The non-reacting herd showed a satisfactory breeding history.

BIRCH, R. R. (1931). **Bang Abortion Disease in relation to Interherd Transfer of Cattle.**—*Rep. New York State Vet. Coll. for 1929-30.* 157-166. Albany: J. B. Lyon Company.

This article deals in detail with the control and eradication of abortion disease by means of agglutination tests and the isolation of reactors.

The author points out that, once the scepticism of the breeder towards the accuracy and advantages of the agglutination test has been overcome, he is apt to go to the other extreme and ignore its limitations.

The most dangerous potential source of infection in a herd under control is from the introduction of new cattle and not from the presence of affected animals within the herd, as the isolation of such animals develops into a matter of routine.

The ideal way to build up a clean herd is to recruit it from its own progeny. When the purchase of new animals is unavoidable, it is advisable to purchase either non-reacting females which have not reached sexual maturity or open cows which have given a negative reaction at least 30 days after calving. All newly purchased animals should be kept separate from the main herd pending one or two tests.

The author points out that the establishment of reacting herds (herds in which the breeding animals have an agglutination titre of 1: 80 or over) is highly desirable. Such herds, if judiciously managed, allow of the utilization of reacting, but otherwise valuable, animals which, in the ordinary way, would either have to be slaughtered or retained in clean herds where they would do great harm.

It is claimed that a herd of carefully selected reactors will be more profitable than an ordinary mixed herd containing reactors and non-reactors.

The introduction of recently aborted cows into reacting herds would appear to be free from danger and to have no appreciable effect on the incidence of abortion in the herd.

BIRCH, R. R., & GILMAN, H. L. (1931). **The Agglutination Test in relation to the Persistence of *Bact. abortus* in the Body of the Cow.**—*Rep. New York State Vet. Coll. for 1929-30.* 56-88. 2 tables. [7 refs.] Albany: J. B. Lyon Company.

The authors investigated a phase of abortion disease which has hitherto been given insufficient attention, although it is of great practical importance on account of the difficulties inherent in it.

It is generally recognised that, in the case of certain cows which show a high agglutination titre over long periods, repeated examination of the milk fails to reveal the presence of *Br. abortus*.

Employing the method of guinea pig inoculation, the authors searched for the presence of *Br. abortus* in the organs of artificially infected cows.

The organism was present in the supramammary lymphatic glands of 7 out of 17 cows, but it was not demonstrated in the milk from four out of the seven cows during life.

Most of the existing evidence supports the view that, in naturally infected cows, *Br. abortus* rarely persists in the genital tract for more than two months after parturition and that it is rarely present for so long a period. *Vide FITCH, DELEZ & BOYD infra.*

The authors were able, however, to isolate the organism from the genital mucosa or sub-mucosa of artificially infected cows, 15, 13, 8 and 7 months after parturition.

Out of 19 cows examined, *Br. abortus* was isolated on two occasions from composite samples of the lymphatic glands of the head and once from the mediastinal lymphatic glands.

FITCH, C. P., DELEZ, A. L., & BOYD, W. L. (1931). Persistence of the Bang Organism after Parturition.—*Vet. Med.* **26**. 333-334.

This is a brief account of work published as Journal Series 917 of the Minnesota Experiment Station (U.S.A.). The authors had 22 aborting cows under observation and found that *Br. abortus* was not excreted from the vagina for longer than three or four weeks after parturition. Any bacilli excreted after that interval were non-viable and were not demonstrable either in culture or by animal inoculation.

FITCH, C. P., DELEZ, A. L., & BOYD, W. L. (1930). Duration of the Elimination of *Bacterium abortus* Bang in Vaginal and Uterine Discharges of Infected Cattle.—*J. Amer. Vet. Med. Ass.* **76**. 680-685. 2 tables. [12 refs.]

The authors examined the uterine exudate of naturally affected cows with the object of making an accurate determination of the interval during which *Br. abortus* is excreted. Exudate was collected in sterile tubes and tested by culture and by guinea pig inoculation.

The results obtained agree fairly closely with those of other workers. Twelve days was found to be the average period during which the organism was excreted in the uterine discharge.

HARMS, A. H. (1931). *Bacterium abortus* (Bang) isolated from a gelatinous Infiltration formed in the Uterus of a Cow.—*J. Amer. Vet. Med. Ass.* **87**. 713-714.

A report of the isolation of *Br. abortus* from the uterine exudate of a cow which had aborted about six weeks before term.

GILMAN, H. L. (1931). The Elimination of *Bact. abortus* in the Milk of Cows.—*Rep. New York State Vet. Coll. for 1929-30.* 142-156. 3 tables. [36 refs.] Albany : J. B. Lyon Company.

In an introduction to this article, Gilman reviews at length some of the more important work that has been done on the problem of udder infection in abortion disease.

He carried out experiments to determine more accurately the correlation between the agglutination titre of milk and the presence of *Br. abortus* in it.

Milk was collected from the four quarters of the udders of 34 cows ; some had high blood titres to the agglutination test, some had low blood titres and some yielded negative reactions. Milk taken from nine of the cows was tested twice with an interval of three months between each test.

The middle milk obtained after centrifuging was used for the agglutination test, while the cream and sediment were inoculated intraperitoneally into guinea pigs.

Nine animals showed agglutinins in the milk from one quarter only ; seven in that from two quarters ; two in that from three quarters and 20 in that from all four quarters. Agglutinins were absent from the milk of seven of the animals.

In two animals, *Br. abortus* was isolated from a single quarter only ; from two quarters in five animals ; from three quarters in two animals and from all four quarters in five animals. In the case of 23 of the animals, there was failure to obtain the organism from the udder although all four quarters were examined.

The organism was not recovered from any milk with an agglutination titre of less than 1:80, nor from the milk of any animal with a blood titre of less than 1:320.

PLANZ, J. F., & HUDDLESON, I. F. (1931). **Brucella Infection in a Dog.**—*J. Amer. Vet. Med. Ass.* **79.** 251-252.

The authors give the case record of a three and a half year old dog in which there was general ill health. The right testicle was swollen and contained an abscess from the pus of which a pure culture of the porcine type of *Br. abortus* was isolated. There was a positive rapid-agglutination reaction with brucella antigen at a titre of 1:500. The reaction was still 1:500 one month after the local lesion had been removed.

GILMAN, H. L., & BRUNETT, E. L. (1931). **Bact. abortus Infection in the Fowl.**—*Rep. New York State Vet. Coll. for 1929-30.* 109-113. [4 refs.] Albany: J. B. Lyon Company.

DUBOIS (1910) described several outbreaks of disease in fowls which he attributed to *Br. melitensis*.

During the past few years the question has again been brought into prominence by reports of outbreaks among fowls in which *Br. abortus* has been incriminated as the causal agent.

The authors carried out agglutination tests with *Br. abortus* antigen on sera sent in for testing for *B. pullorum* infection. Tests of commercial flocks showed that some contained naturally infected birds, but there was no evidence that the disease was widespread.

It was found possible to produce a positive blood titre in fowls by artificial infection and to recover the organism from the tissues at autopsy.

In general, fowls were not found to be very susceptible and tended to overcome infection in from a month to six weeks.

THJØTTA, T. (1931). **Tularemia in Norway.**—*J. Infect. Dis.* **49.** 99-103. [3 refs.]

The author has found that tularæmia is not at all uncommon in Norway. The persons most frequently affected are game hunters and game dealers who contract the disease from affected hares. Another mode of infection is from water contaminated by diseased lemmings, small rodents which migrate together in large numbers.

No definite cases of tularæmia transmitted by insects have yet been seen in Norway.

BLEECKER, W. L. (1931). **Comparison of Efficiency of the Simplified Method of BUNYE, HALL and DORSET and the Standard Tube Test for the Identification of Carriers of Pullorum Disease.**—*J. Amer. Vet. Med. Ass.* **78.** 518-526. 2 tables. [3 refs.]

In view of the vast numbers of tests which are being made annually for the detection of carriers of *B. pullorum*, it is essential that the technique should be simplified as far as is compatible with accuracy.

The author carried out experiments on a modification of the plate method of testing, introduced by BUNYE, HALL and DORSET.

In this test, one drop of whole blood is spread in a thin film on a glass plate and one drop of specially prepared antigen is mixed with it. The antigen consists of a saline suspension of *B. pullorum* titrated to a density 50 times greater than standard I of McFarland's nephelometer.

A positive reaction is indicated by a clumping of the suspended bacteria with the result that the drop of mixture becomes granular; this takes place in 5-30 seconds. In negative cases, the blood-antigen mixture remains turbid.

Bleecker found that, in experienced hands, this whole blood test was as efficient as the tube method.

BAUMANN, R., & GRATZL, E. (1931). Paratyphus-Breslau-Erkrankungen beim Pferd. [Disease in Horses caused by Breslau Paratyphoid Bacteria].—*Wien. tierärztl. Mschr.* **18.** 322-336 & 353-360. 2 plates. 2 tables. [33 refs.]

Describes in detail eight cases of infection in adult horses with bacilli of the Breslau para-

typhoid type and gives details of two horses the authors infected experimentally. The natural cases showed colic followed by gastro-enteritis and seven of the horses died whilst, of the experimental horses, one died and the other recovered in 14 days. The course of the naturally occurring infection lasted for from 5-12 days.

The organisms were isolated *intra vitam* from the blood, from material obtained by liver puncture and from the faeces ; they were also isolated *post-mortem* from the stomach contents.

PRÆSCHOLDT, O. (1931). Gärtnerinfektionen der Kälber und Rinder. [B. *enteritidis* Infections of Calves and adult Cattle].—Zeitschr. Infektkr. 39. 115-140. [87 refs.]

A review supplemented by an account of observations made by the author over a period of several years. The clinical symptoms in affected animals consist mainly of fever, haemorrhagic enteritis and a more or less pronounced disturbance of the general health. The causal organism was isolated from the faeces and examined serologically. The disease broke out when animals were turned out at pasture. In two herds in which cows and calves were kept together, the adult cattle apparently contracted the disease from the calves. Observations made to determine the length of time during which the organisms could be excreted by adult cattle indicated that adults could remain carriers for years. For the control of the disease, the author recommends regular examination of faeces and the elimination of all carriers and of positive reactors, together with thorough disinfection of byres and premises.

HŒVE, K. R. (1931). Die deutschen Rauschbrandgebiete. [Districts affected with Blackleg in Germany].—Deuts. tierärztl. Wschr. 39. 404-408. 1 map. 7 tables. [7 refs.]

A statistical survey of the occurrence of the disease among cattle and sheep between 1919-1928 in the Reich. A map is given showing the incidence in various provinces during the years under review.

LEMÉTAYER, E. (1931). De la prophylaxie spécifique du téton chez les animaux domestiques. [Tetanus Prophylaxis in Domestic Animals].—Rev. Path. comp. 31. 663-694.

The author gives an extensive review of the subject and recounts the results obtained up to date from the vaccination of army horses against tetanus. Since this has been carried out as a routine measure, the average annual incidence of tetanus has fallen from 5.64 per cent. to 0.60 per cent. and mortality has completely disappeared.

MC EWEN, A. D. (1931). A Sporulating Anaërobic Bacillus Similar to the Causal Organism of Black Disease.—J. Comp. Path. & Therap. 44. 149-158. [2 refs.]

A bacillus, similar to the *B. oedematiens* type of microorganism, was isolated in four instances from the tissues of sheep which had died suddenly in such circumstances that there was a suspicion that death was due to pathogenic anaërobic bacteria. The bacillus was isolated once in the course of 150 examinations of the tissues of sheep from the Romney Marsh, Kent, and three times in the course of the examination of five sheep from Wales. In two of these cases it was isolated from the heart blood and, in the other instances, from voluntary muscle. The material from which the organisms were isolated appeared to be fresh in each instance ; microscopical examination of preparations from it always showed an apparently unmixed growth of gram-positive bacilli with rounded ends ; these occurred singly or in pairs or in short chains of three to four individuals.

The bacilli were anaërobic ; no motility was observed in sealed preparations. In 24 hour old broth cultures containing minced meat, they were present as large stout gram-positive and irregularly gram-positive rods with rounded ends, up to 12-14 μ in length. Spores were present in many instances ; when fully developed, the spores were wider than the bacilli.

In minced meat medium, gas production was moderate ; there was no colour change in the

meat and it was not digested. Gelatine was slowly liquefied. In broth containing brain tissue and a piece of iron, the brain tissue was blackened, but there was no blackening in cultures from which the iron was absent.

Separate colonies were readily obtained in shake liver agar. The majority had a compact though irregular centre surrounded by a zone of openly woolly or filamentous growth. Light fluffy or woolly colonies with a compact centre were formed and also compact colonies surrounded by a number of pin point compact colonies. Simple lenticular colonies and lenticular colonies with outcrops or tufts of growth from the centres of their biconvex surfaces were also produced. The medium was only fragmented by gas when the colonies were very numerous.

On blood agar plates the colonies grew with slightly raised centres and delicate irregular filamentous processes radiating from them. It was difficult to obtain growth on serum-agar and there was no surface growth on Filde's influenza medium, on liver agar or on liver glucose-agar.

Glucose, lactose and maltose were fermented; after growth in these sugars had ceased, it was impossible to demonstrate their existence by the Benedict qualitative method. The action on glycerine was doubtful; lactose, saccharose, salicin, inulin and mannite were not fermented.

Inoculation into guinea pigs produced lesions comparable to those caused by *B. oedematiens*. The bacillus was pathogenic for sheep and produced extensive oedematous local lesions at the site of inoculation, congestion of the fourth stomach and small intestine and death in 24 hours.

Filtrates inoculated intravenously into rabbits caused death within an hour or two.

In a small experiment, rabbits inoculated with formolised culture were immune to a subsequent inoculation with filtrate, whereas a control rabbit died.

Serum from the immunised rabbits neutralised the toxin of three homologous strains and also *B. oedematiens* toxin. *B. oedematiens* serum neutralised toxin produced by the bacillus.

The author discusses certain similarities and differences between the bacillus and *B. oedematiens*. The bacillus appears to have a peculiar local distribution. The questions of whether "black disease" occurs in this country and of whether the bacillus causes disease independently of liver fluke infestation require further investigation.

MINETT, F. C., & STABLEFORTH, A. W. (1931). Studies on Bovine Mastitis. IV. The Occurrence in Mastitis of Haemolytic Streptococci showing Group Similarity to *Streptococcus pyogenes* of Man.—*J. Comp. Path. & Therap.* 44. 114-125.

The authors refer to their previous publication [MINETT, STABLEFORTH & EDWARDS. (1929). *J. Comp. Path. & Therap.* 42. 213.] in which they gave an account of the isolation of streptococci from 82 out of 113 clinical cases of mastitis. Of these, 52 strains appeared to belong to the beta-haemolytic group, but 13 of them were exceptional in some of their properties.

The authors have now examined these exceptional strains and describe at considerable length the various tests that were applied to them. They conclude that the 13 strains were indistinguishable from *Streptococcus pyogenes* of man.

It is interesting to note that, with the exception of four, all the samples came from widely separated farms, that all the animals were milked by hand and that there was no history of illness in the milkers or in persons in contact with the cattle.

KRAGE, P., & GIPMANN, W. (1931). Beiträge zur bakteriologischen Diagnostik und Impftherapie der Streptokokkenmastitis der Rinder. [Contributions on the Bacteriological Diagnosis and on Vaccination in Streptococcal Mastitis of Cattle].—*Arch. wiss. prakt. Tierhkl.* 63. 65-77. 7 text figs. [16 refs.]

The authors describe the bacteriological methods used in routine work at the Bacteriological Institute of the Chamber of Agriculture for the Province of Eastern Prussia. While the methods are similar to those in general use, they consider that some improvements in the methods of cultivation shorten the time necessary for making a diagnosis, especially in the case of mixed samples of milk in which the organisms are present in very small numbers.

The value of vaccination was tested on a herd of infected cattle for a period of one and a half

years. The animals were inoculated with live and with killed (58° C. in water bath) autogenous vaccines. Success was attained with the live vaccines and the authors consider that the disease can be prevented and eliminated by a combination of such vaccination with suitable hygienic measures.

BENNETT, S. C. J. (1931). **Cryptococcus Pneumonia in Equidæ**.—*J. Comp. Path. & Therap.* **44.** 85-105. 7 text figs. [5 refs.]

The author describes a form of pneumonia occurring in equines in the Sudan which appears to be a primary condition probably caused by *C. farciminosus*. In an appendix, he gives a detailed account of the individual cases.

He admits that the parasite may not be *C. farciminosus*, as a complete examination has not yet been made and also that the lung lesion may not actually be a primary one. The lung lesion which is an interstitial pneumonia without the usual evidences of inflammation is, however, quite different from that which has been described occasionally as occurring in cases of epizootic lymphangitis of long standing.

He gives reasons in support of the view that the occurrence of the lesion may have been overlooked in the past ; this would explain why its nature has not previously been determined.

He makes no claim that the description now given is complete or final, but thinks it advisable that the available information should be published.

Up to the present, the condition has been seen only in horses and mules ; no cases have been encountered in donkeys.

The clinical symptoms are somewhat indefinite, but the main feature is an accelerated and increasingly shallow respiration ; slight rises of temperature occurring at irregular intervals have been recorded. The appetite is for the most part maintained, but there is steady loss of condition.

On *post-mortem* examination, the lesions in the lungs are found to vary greatly in extent and distribution. No involvement of the pleura or bronchial glands has been found. The affected portions of the lung tissue are very pale in colour, but there is no inflammatory congestion around them. Little or no liquid can be squeezed from incised lesions and, in cases where it is impossible to obtain exudate, the parasite may not be demonstrable in smears from the lung tissue. The degree to which the infection can progress is apparently dependent upon the extent to which the lung tissue is already invaded. In cases where the lesion is localised, it may develop to an advanced stage and the cryptococci may be present in the exudate in very large numbers.

The pleura may be thickened owing to infection of the deeper layers when a lesion develops close to it, but no lesions have been found in the superficial layers.

In the cases encountered, no lesions have been found in any other organ and in only one instance was there a history of superficial lymphangitis.

The histological changes are divided into four stages for the convenience of description.

FIRST STAGE. There is infiltration of the connective tissue of terminal bronchi with mononuclear cells, without any evidence of vascular congestion. The infiltration spreads to neighbouring interlobular septa until one or more whole lobules are involved. There is no exudate in the cavities.

SECOND STAGE. The mononuclear cells which appear to be lymphocytes are replaced or, more probably, outnumbered by large mononuclear cells. The small bronchioles, veins and arteries are gradually destroyed by the invasion. The large mononuclear cells are possibly derived from the alveolar epithelium.

THIRD STAGE. This appears to be the stage during which the parasites overcome the tissue cells. There is fusion of the large mononuclear cells resulting in the formation of giant cells and the cryptococci become visible within some of the large cells. A single cell containing large numbers of parasites may be found. There is no evidence of the formation of fibrous tissue.

FOURTH STAGE. This is marked by the destruction of the invaded cells and the continued proliferation of the parasites.

The changes seen in the third and fourth stage offer an explanation of the difficulty in detecting the parasite in smears from the lesions unless exudate can be obtained by pressure.

In the pleura, there is marked formation of inflammatory fibrous tissue, but no disease of the endothelium.

Up to the present no lesions or parasites have been found in the bronchial glands.

The author discusses the probable identity of the organism concerned and criticises the accounts given by certain authors of other forms of cryptococcus invasions, which were thought to have been caused by different species. He concludes that, for the present, it is best to consider that the various types of cryptococcus infection which have been described in lung lesions in horses are in all probability caused by *G. farciminosus*.

CATANEI, A. (1931). Etude d'une teigne de mouton produite par une espèce nouvelle de *Trichophyton*, *Tr. pruinorum* n. sp. [A new Form of Ringworm of Sheep caused by *Trichophyton pruinorum* n. sp.].—*Bull. Soc. Path. exotique*. 24. 296-301. 1 plate, 4 figs. [2 refs.]

LESTOQUARD first drew the attention of the author to this form of ringworm in sheep.

The organism as found in the lesions is a large spored ecto-endothrix. The greater part of the growth is outside the affected hairs where a sheath is formed.

Growth can be obtained on suitable media, a temperature of about 28° C. being required for primary cultures; subcultures will grow quite well at 22° C.

Primary cultures at two or three weeks present a slightly raised surface with a pale violet-brown or brownish-yellow colour. There is a rounded knob about 2 mm. in diameter in the centre and the edges show short radiating filaments, closely packed and of variable length. At first the surface of the colonies is moist and glistening, but later it becomes velvety and may also become wrinkled.

Microscopical examination of cultures of various ages has revealed the presence of four kinds of elements:—

(a) Mycelial filaments which are about 4 μ in diameter and are irregularly septate with side branches; these forms are found most extensively in older cultures.

(b) Arthrospores which vary considerably in size.

(c) Chlamydospores which may be found either in a terminal or lateral position on filaments; those parts of the colonies which become whitish in colour are richest in this form.

(d) The mycelium may show lateral buds which do not appear to be spores.

No sporangia have been seen.

The parasite has been transmitted to two sheep, a calf and a guinea pig. In these animals it is an ectothrix.

The author gives a table showing the principal characters of the known species of *Trichophyton*.

DISEASES CAUSED BY PROTOZOAN PARASITES.

ROBERTSON, Andrew. (1931). Coccidiosis in Calves.—*Vet. J.* 87. 312-326 & 351-385. 9 figs. [162 refs.]

The author's material was obtained in part in Honduras and in part from an abattoir in London. Nothing new has been added to our knowledge of the disease or of the parasite responsible. For the most part the paper is in the nature of a general review of the literature on the subject; there are more than six pages of references.

STAFSETH, H. J. (1931). Studies in the Pathology of Avian Coccidiosis.—*J. Amer. Vet. Med. Ass.* 78. 798-816. 12 figs. 1 table. [18 refs.]

From the results of his experiments the author concludes that, in chicks, coccidiosis is associated with the caeca and lower gut; in older birds, the duodenum is the more common seat of infection. *Eimeria tenella* and *E. acervulina* were two of several species present. No coccidia were found in the liver lesions which are occasionally met with in chickens. Coccidia found in a number of sparrows all belonged to the genus *Isospora*. Leg weakness and paralysis occurred with duodenal coccidiosis, but there was no direct proof that the two conditions are related to each other. Coccidia, morphologically identical with those of the fowl, were found in pigeons affected with leg weakness.

YAKIMOFF, W. L., & RASTEGAIEFF, E. F. (1931). Zur Frage der endoglobulären Parasiten der Rinder in dem nord-westlichen Gebiet Russlands (U.S.S.R.). [The Endocorpusecular Parasites found in Cattle in the North-Western Part of Russia (U.S.S.R.)].—*Arch. Protistenk.* **73.** 111-119. 1 plate. [12 refs.]

The endocorpuseular parasites of bovines in the area are discussed and classified. Apart from *B. bovis*, others which were observed are named *Babesia karelica*, *Francaiella caucasica* and *F. occidentalis*.

YAKIMOFF, W. L., & DEKHTEREFF, N. A. (1930). Zur Frage über die Theilerose in Ostsibirien. [Theileriasis in Eastern Siberia].—*Arch. Protistenk.* **72.** 176-189. 1 plate. [19 refs.]

An historical survey of cases of theileriasis reported in the past from Eastern Siberia and the Far Eastern Pacific Provinces by Russian observers, followed by the authors' account of an outbreak near Vladivostock. The morphological data are set out in three tables and there is a considerable amount of description. As the causal parasite differed morphologically from other members of the *Theileria* group, the authors provisionally named it *Theileria sergentii*. The disease was apparently transmitted by a species of *Hæmophysalis*.

PEARCE, L. (1930). The Treatment of Human Trypanosomiases with Tryparsamide.—*Monograph Rockefeller Inst. Med. Res.* No. 23. 389 pp. Appendices A to Z. [73 refs.] New York : Lancaster, Pa : The Science Press Printing Company. \$2.

A critical review analysing the available records of cases which bear on tryparsamide therapy of African sleeping sickness. In all 1,848 cases are considered, the majority of which are representative of the various phases of the advanced disease. The review covers the whole ground since the tryparsamide treatment was introduced into the Belgian Congo in 1921 [PEARCE. (1921). *J. Exp. Med.* **34.** suppl. 1. 1]. A temperate attitude of mind is maintained throughout the monograph and the compound is discussed not only from the point of view of its biological action, but also from the point of view of large scale administration under field conditions which the incidence and distribution of sleeping sickness impose.

Chapter 1 deals with "biological considerations"; Chapter 2 with "sources of materials and methods of present analysis"; Chapter 3 with "administration and dosage"; Chapter 4 with "complications of drug administration"; Chapter 5 with "therapeutic results in advanced cases of *T. gambiense* infection"; Chapter 6 with "therapeutic results in advanced cases of *T. gambiense* infection in the Belgian Congo"; Chapter 7 with similar cases in the Cameroons, and Chapter 8 with cases in French Equatorial Africa; Chapter 9 with "failures in *T. gambiense* infection"; Chapter 10 with "successful results (six months or longer) in *T. gambiense* infection"; Chapter 11 with "therapeutic results in cases of *T. rhodesiense* infection."

The final chapter, 12, [pp. 217-224] gives a "general discussion" followed by an addendum [pp. 225-228] bringing the review up-to-date of going to press, and including papers appearing during 1929. The bibliography [pp. 229-230] contains 73 references up to 1928. The appendix, "notes on case histories," covers 39 pages of closely packed tabular summaries of data.

From this description of the monograph it will be realised that any attempt to abstract it for the benefit of specialised workers on chemotherapy would be of little value. For the general reader, however, a few points may be picked out:—

(a) Tryparsamide is the trade name for the sodium salt of N.-phenyl-glycine-amide-p-arsionic acid. It is a stable, white, crystalline powder containing approximately 25 per cent. of arsenic. It is readily soluble in cold water. Solutions are less stable than the dry salt which, if kept in tightly stoppered bottles away from strong sunlight, may be stored for long periods. Solutions should therefore be made up fresh for use, a common method being to dissolve 10 g. in 20 c.c. of sterile water so obtaining a bulk of 25 c.c. or a 40 per cent. solution. 20 per cent. solutions are also used. It is sold in ampoules containing 1, 2, and 3 g., representing the usual human dosage at weekly intervals by parenteral injection (intravenous, intramuscular, or subcutaneous); it is also marketed in units of 25, 50, or 100 g. by the five firms manufacturing it under free non-transferable license from the Rockefeller Institute, which developed the product and owns the trade

mark in the interests of the public. The tryparsopal made by a Belgian firm without licence is represented to be the same compound.

(b) The therapeutic index of tryparsamide is not high. In guinea pigs infected with *T. brucei*, and in mice infected with *T. brucei*, *T. gambiense* and *T. equinum*, the curative dose is about one-tenth of the tolerated dose. For rats the ratio of curative dose to toxic dose is about 1 to 3. It happens, however, that the actual curative value in man and the larger domestic animals is greater than the potential trypanocidal activity indicated by the usual laboratory animals. Since the infected rabbit shows many of the conditions found in man (including the involvement of the central nervous system) it is the laboratory animal of choice. With this animal the unit dose required to cure active blood stream infections with *T. gambeinse* and *T. brucei* is no higher than in mice. This is an exceptional behaviour when it is considered that for arsphenamin and neo-arsphenamin the required dose is about five times as high in the rabbit as in the mouse; while for luargol, the therapeutic index of which is much higher than in the case of the arsenphenamines, more than six times the curative dose for mice had little effect on rabbits. The reasons for selecting tryparsamide in preference to other arsenicals were chiefly its high "therapeutic penetrability" which conferred a more general parasiticidal action throughout the body, its freedom from injurious action, its stimulative action, and its efficacy in experimental infections (rabbit) in which the conditions closely resemble those occurring in human trypanosomiasis.

(c) The general results in the 1,848 cases recorded, conclusively demonstrate that tryparsamide induces pronounced beneficial effects in advanced cases of *T. gambiense* infection. In early cases peripheral sterilisation is rapid, with 96 per cent. successful results. In cases of *T. rhodesiense* infection the beneficial effect is attributed to the stimulative action upon the general body economy.

(d) Weekly dosage of 0.05 g. per kilo (for human beings) is a common figure, with a total dosage of from 2 g. up to 100 g. in extreme cases. As a general guide, a total dosage (10 weeks) of about 0.50 g. per kilo is given and children can tolerate even more than the adult dosage calculated on the basis of bodyweight. For early cases a single uninterrupted course is advised. For advanced cases repetition at intervals of a few months is practised. Progress is controlled by examination of cerebrospinal fluid. Of the 1,101 advanced cases in the 22 groups studied, apparent successes are recorded as 59 per cent., improvements as 25 per cent., and failures as 16 per cent. The duration of observation ranged, in various instances, from 5 months up to 30 months. Success is now so well recognised by the native population that native co-operation is voluntarily offered. Governmental and medical authorities have taken up tryparsamide, the shipments to the Belgian Congo for government use in 1927 being 4,300 kilos.

(e) Previous treatment with less effective arsenicals such as atoxyl tends to reduce the response to tryparsamide, probably because of the prolongation of infection and deleterious effects of a long standing chronic disease upon the reactive receptivity of the patient. In general the use of tryparsamide is replacing other methods of treatment. Bayer 205 proved effective in early cases in Tanganyika Territory, but tryparsamide was more satisfactory for advanced cases.

DISEASES CAUSED BY FILTERABLE VIRUSES.

WINKEL, A. J. (1931). Iets over de Stammen van het Mond-en Klauwzeervirus in Nederland gedurende de laatste drie Jaren. [The Types of Foot and Mouth Disease Virus that have occurred in Holland during the last three Years].—Tijdschr. Diergeneesk. 58. 793-801. 2 tables.

Since 1928, efforts have been made to identify the types of virus responsible for outbreaks of foot and mouth disease in Holland and 39 experiments have been carried out.

In 24 trials, the immunising properties of sera derived from recovered animals were tested against A and O strains. Serum was inoculated into a series of guinea pigs in a graduated range of doses, together with either the A or O types of virus, to ascertain which type was specific to the serum. In the remaining 15 tests, virus was inoculated into guinea pigs which had previously been immunised against the type strains.

During the first two years (1928 and 1929), all the outbreaks were apparently caused by virus A, but from the early part of 1930 only the O type was identified.

Some of the tests apparently indicate that the immunity conferred by the injection of a strain of virus is not always absolutely specific.

MANNINGER, R. (1931). Sur la pluralité du virus aphtheuse. [The Plurality of the Virus of Foot and Mouth Disease].—*Bull. Off. internat. Epiz.* 5. 1-20, 204-211 & 252.

It is now established beyond all doubt that there is more than one type of the foot and mouth disease virus and it is very probable that, in addition to the O, A and C types and their sub-types, other varieties occur. These varieties must not be looked upon as fixed types, but as variants, capable of being influenced by factors which may only be temporary. Experience appears to indicate that the type possessing the most stable characters is the O type and that variation from this type is likely to occur at the beginning of an outbreak. As the outbreak progresses there is a tendency to revert to the O type.

The factors which are probably of importance as offering an explanation of relapses are:—plurality of virus and, according to VALLÉE and CARRÉ, hypersusceptibility. It is quite within the bounds of possibility that other important factors may be discovered.

The only thing that can be said at the moment regarding the significance of the plurality of virus in the use of scientific products is that plurality should not be omitted from consideration. It is a matter of very considerable importance that, in outbreaks of foot and mouth disease, every effort should be made to determine the characters of the virus present as accurately as possible. This work should be carried on in whatever country opportunities occur.

In the course of the discussion, a communication from WALDMANN was read by WEHRLE. WALDMANN maintains that, up to the present, only three types of virus have been demonstrated, viz.:—O, A and C, and that, while variations of these three types occur, the types are comparatively rigidly fixed. He does not agree that variation tends to go in the direction of the O virus.

BÜRGI pointed out that the existence of a number of types is responsible for difficulties in connection with prophylaxis and for the necessity of using polyvalent sera. When foot and mouth disease becomes rapidly widespread, however, the best prophylactic agent is the blood of animals that have actually recovered from the disease in the infected area. At the same time, the rigid enforcement of sanitary police regulations is essential.

BISANTI supported the view that only three types of virus have been identified up to the present.

GERLACH spoke in a similar sense.

HORTA stated that, in Brazil, the O type is predominant, but that the A and C types appear occasionally. He believed that the virus present in Brazil was somewhat attenuated, as curative measures with gonacrine and trypaflavine had certainly been valuable in cutting short an outbreak.

BÜRGI supported the view that recovered animals may be carriers of the virus and said that, for this reason, quarantine for eight months is imposed on recovered animals in Switzerland.

Among the resolutions on the subject, it was decided that a standard technique should be devised and adopted in all tests for the identity of virus. Serums form a valuable adjunct to sanitary police measures employed for the control of the disease. Polyvalent sera must be used; the serum of recovered animals at the seat of an outbreak is a valuable aid in the control of the disease.

—. (1931). Enquête sur la répartition des divers types du virus aphteux. [Inquiry into the Distribution of the various Types of the Virus of Foot and Mouth Disease].—*Bull. Off. internat. Epiz.* 5. 264-266. 1 table.

(a) GERMANY. The incidence of foot and mouth disease in Germany is decreasing. Only the O, A and C types of the virus have been detected. Further research is necessary regarding the differentiation of types.

(b) GREAT BRITAIN. In 1925 and 1926 seventeen strains were examined. Sixteen of these were of the O and one was of the A type. During the period 1927-30 twenty-eight strains were tested. These were all of the O type except one which did not appear to be of the O, A or C types.

(c) HOLLAND. Types O and A are encountered.

(d) SWEDEN. Ten strains were found to correspond to the O type.

Examination of two Swedish strains, A and O, which had been maintained since 1925 and 1926, showed that the A type had retained all its characters.

GILDEMEISTER, E. (1931). Ueber das Vorkommen des Virus der Maul- und Klauenseuche in Pockenlymph. [On the Presence of Foot and Mouth Disease Virus in Pox Lymph].—*Zlb. Bakt. I. (Orig.)*. **120**. 83-85.

After a review of literature previously published on this subject, the author describes the technique used in Germany to ensure that pox lymph is free from contamination with the virus of foot and mouth disease. In Germany, there is an order prohibiting the use for lymph production of animals which are not in perfect health. This is enforced by veterinary inspection of the animals, both before and during use for the preparation of the lymph. In addition, all animals killed for serum must be examined *post-mortem*.

The author examined pox lymph produced at all the state vaccine laboratories and in no case could any trace of foot and mouth disease virus be demonstrated by the inoculation of lymph into the pads of guinea pigs.

Details of differential diagnosis between the two virus infections as tested by this method are described. Briefly, foot and mouth disease lesions develop much more rapidly than those of vaccinia.

PYL, G., & KÖBE, K. (1931). Aktivierungsversuche am Virus der Maul- und Klauenseuche. [Experiments on Activation with the Virus of Foot and Mouth Disease].—*Zlb. Bakt. I. (Orig.)*. **121**. 301-304. 3 tables. [10 refs.]

The authors give an account of experiments regarding the influence of the REYNALS factor [see this *Bulletin*. **1**. 136.] on the virus of foot and mouth disease. By scarifying the pads of normal guinea pigs, they tested the pathogenic action of virus, taken from 24 hour old guinea pig lesions, when mixed with:—(a) buffer phosphate solution at pH 7.6 (according to Sörensen); (b) fresh rabbit testicular extract at pH 7.27; and (c) Ringer solution at pH 7.08.

These mixtures are given in order of virulence; the authors attribute the variations in virulence to the relative pH of the solutions.

Failing to demonstrate any increase in the infectivity of virus mixed with testicular extract, they carried out further experiments to discover whether this extract would hasten the course of the disease, but obtained negative results.

They also carried out further tests with virus in buffer phosphate solution at pH 7.6 and with virus testicular extract in similar solution. The former caused the appearance of secondary foot lesions within 48 hours, whilst the latter with a lower dilution of virus required 86 hours to achieve the same result.

Other experiments with guinea pig and bull testes gave similar results. Virus-free ultra-filtrates had no exalting effect upon the potency of foot and mouth disease virus; the pH factor appeared to be all-important in this connection.

PYL, G. (1931). Fermentstudien am Virus der Maul- und Klauenseuche. [Studies on Ferments of the Foot and Mouth Disease Virus].—*Zlb. Bakt. I. (Orig.)*. **121**. 299-301. [1 ref.]

POPPE & BUSCH [(1930). *Zlb. Bakt. I. (Orig.)*. **119**. 398] reported that they had found the ferments amylase, lipase and oxydase in cell-free vesicle fluid, in the epithelium covering the vesicles and in the blood of animals affected with foot and mouth disease. They considered that the presence of these ferments is related to a property of the living virus and stated further that the concentration of the ferments corresponds to the virulence of the virus.

Pyl declares that these authors confused virus with virus-containing substrate and that the ferments owed their presence to the tissue and not to the virus. In support of this view, he says that the ferments were present in vesicles he produced on the pads of normal guinea pigs by scalding. The means taken to demonstrate the ferments are described.

SCHIPTORST, H. W. (1931). Behandling van Mond- en Klauwzeer met Reconvalsenentenbloed. [The Treatment of Foot and Mouth Disease with the Blood of Convalescent Animals].—*Ned.-Indisch. Blad. v. Diergeesk.* **43.** 97-112.

Particularly virulent outbreaks of foot and mouth disease occurred in Java during 1929; in many instances the disease proved fatal.

Treatment with the blood of convalescent animals was resorted to; the blood was collected in citrate solution from animals in which mouth lesions had developed and were healing. 0.5 per cent. phenol was added to kill blood parasites. The doses used ranged from 15 c.c. for newly born calves up to 80 c.c. for adult animals.

In all, 5,744 bullocks and buffaloes were inoculated and 5,664 remained healthy; 80 became infected and 22 of them died or were killed. The addition of the phenol to the blood did not appear to achieve its purpose, because in one area an outbreak of anaplasmosis occurred about six weeks after the injections had been carried out. This area was considered to be free from ticks and, although microscopical examination of the blood was carried out with negative results before it was used for the injections, some of the blood almost certainly contained anaplasms. The addition of 0.5 per cent. phenol had not then been effective. The addition of phenol in that strength is fatal to trypanosomes.

KOLLER, G., & ARNDT, F. (1931). Versuche über die quellwirkung einiger zur Bekämpfung der Maul- und Klauenseuche verwendeter Desinfektionsmittel. [Experiments regarding the Capacity for producing Swelling possessed by Disinfectants used in the Control of Foot and Mouth Disease].—*Arch. wiss. prakt. Tierhlk.* **63.** 288-293. 10 charts. [4 refs.]

There is general agreement that caustic soda is a more powerful disinfectant for the virus of foot and mouth disease than are the carbolic and chlorine compounds which are so effective against bacteria. This characteristic of caustic soda is due to its lytic action upon the organic materials associated with the virus. It causes swelling and subsequently solution of colloids and, consequently, liberation and destruction of the virus. The bactericidal disinfectants cause coagulation of albumen which surrounds the virus with a protective layer.

The authors record a series of experiments carried out to determine whether there is any relationship between disinfecting capacity and power of producing swelling.

The following substances were used in the tests:—chemically pure caustic soda, "duramin" (an alkaline powder which in water gives up caustic soda), commercial sodium carbonate, physiological saline solution, distilled water and "duramin II & III" (modified "duramin" preparations).

The details of the various experiments are shown and are accompanied by graphs.

It was found that 4 per cent. solutions of "duramin," "duramin II," "duramin III" and 1 per cent. caustic soda, produced equal amounts of swelling in the gastrocnemius muscle of the frog. Small variations in the concentration of the solutions used had only a very slight effect on the degree of swelling, but were not compared together. Isotonic salt solution produced hardly any swelling.

It is, therefore, apparent that there is a close relationship between the capacity of these substances for producing swelling and their power of disinfection against the virus of foot and mouth disease, as shown by TRAUTWEIN & PEPPIN [(1928) *Arch. wiss. prakt. Tierhlk.* **58.** 95]. The swine fever virus behaves similarly to such disinfectants according to MIESSNER & GEIGER [(1930). *Deuts. tierärztl. Wschr.* **38.** 1.]

NIKOLSKY. (1931). Note sur l'étude et la prophylaxie de la fièvre aphteuse. [Note on the Study and Prophylaxis of Foot and Mouth Disease].—*Bull. Off. internat. Epiz.* **5.** 277-278.

The writer of this note touches briefly upon the general outline of the plan which is being put into operation in Russia for the control of foot and mouth disease. It appears that education of the people is to take the place of police restrictions.

MITCHELL, J. F. (1931). Four Outbreaks of Foot and Mouth Disease (*Aftosa*) in Peru.—*J. Amer.*

Vet. Med. Ass. **79.** 233-235. 2 tables.

A short account of a series of outbreaks of foot and mouth disease due to the infection of roads as the result of affected cattle being driven over them a few days earlier. Local treatment of the lesions was undertaken in some herds and, in others, the disease was controlled by the slaughter of affected and in-contact animals. In the two larger outbreaks, in which the infection passed through the herd in 4-6 weeks, there was a mortality of 10 and 5 per cent. respectively. Sheep, goats and llamas, exposed to infection from cattle, all failed to become infected.

SHOPE, R. E. (1931). An Experimental Study of "Mad Itch" with especial Reference to its Relationship to Pseudo-rabies.—*J. Exp. Med.* **54. 233-248. 4 tables. [12 refs.]**

In August, 1930, the author had occasion to study "mad itch" in 9 out of a herd of 12 dairy cattle in Johnson county, Iowa.

The symptoms were intense pruritus, followed in 24 hours by weakness; death, preceded by convulsions, occurred after a further 24-36 hours.

One of the nine animals did not show pruritus, but it died in the same manner as the others after being ill for six days.

Portions of brains, preserved in 50 per cent. glycerol, from three of these cases, and cerebro-spinal fluid from another were obtained and used for experimental purposes after two weeks' storage on ice. In these experiments, positive results were obtained only in those animals inoculated with brain material from the atypical case in which there was no pruritus.

Cattle which had died from "mad itch" showed nothing beyond slight cardial petechiae and skin lesions. Uniformly fatal infection in rabbits followed subcutaneous, intracerebral, intravenous, intratesticular, intraperitoneal and intranasal inoculation with "mad itch" virus. Guinea pigs succumbed to subcutaneous, intraperitoneal, intratesticular, intracerebral and intranasal inoculation.

White rats and mice were regularly susceptible to intracerebral inoculation and irregularly susceptible to intraperitoneal inoculation; they resisted subcutaneous inoculation.

A filterable virus was present in the lungs and at the site of subcutaneous inoculation and also in the brains of those animals inoculated intracerebrally. Virus was never isolated from the heart, liver or spleen.

In addition to rabbits, guinea pigs, grey field mice, ducks, chickens and swine were found susceptible, but not all were susceptible to the same methods of administration.

In an experiment performed on a rabbit doe and her litter, there was apparently no transmission by contact.

Affected animals develop immune bodies in their blood and their blood serum neutralises virus and protects animals against artificial infection.

The author did not attempt to determine the natural mode of infection in cattle.

Virus from rabbit brain stored in 50 per cent. glycerol at refrigerator temperature was potent after 154 days and similar material, frozen and dried by SWIFT's method, was potent after 106 days' storage.

As a result of comparative studies of the "mad itch" virus and a Hungarian strain of the pseudo-rabies virus provided by AUJESZKY, Shope considers that the two viruses are identical, although several minor differences were found between them.

RAMON, G., & LEMÉTAYER, E. (1931). Sur quelques lésions de l'appareil digestif chez chevaux ayant succombé à l'anémie infectieuse. [On some Lesions of the Digestive System in Horses which have died of Infectious Anæmia].—*Bull. Acad. vét. de France.* **4. 278-280.**

The authors consider that examination of the stomach and intestines reveals lesions of major importance in the diagnosis of equine infectious anæmia. They say that, in acute and subacute cases, in addition to the common lesions in the heart, etc., the stomach is full of food, there is great congestion of the mucosa of the pyloric sac, and the intestine shows numerous subserous petechiae and echymoses, as well as areas of congestion of the mucous coat; a condition of anterorrhagia is sometimes present.

SEIFRIED, Oskar. (1931). Die Hortegaschen Zellen im "entzündlichen Reaktionskomplex" der Bornaschen Krankheit. [Hortega's Cells in the Inflammatory Reaction Complex in Borna Disease].—*Arch. wiss. prakt. Tierhlk.* **63.** 294-306. 11 figs. [10 refs.]

The author discusses the distribution of the principal types of glia cells—astrocytes and Hortega cells—in the lesions of the nervous system in Borna disease.

The material employed was obtained from experimentally infected rabbits as fresh material from equine cases was not available. The animals were killed at varying intervals after intracerebral injection of the virus; control material was examined from uninfected rabbits. Bromformol, formalin and alcohol were used as preservatives and sections were cut with a freezing microtome. Hortega's silver carbonate method was used and, in some cases, special stains were employed to demonstrate the presence of fat and iron. Special emphasis is laid upon the necessity for strict adherence to the details of the technique. Cajal's gold sublimate method was used for the demonstration of astrocytes and Bellschowsky's stain was used in conjunction with Herscheimer's scharlachrot stain for the demonstration of neuro-fibrils.

Multiplication of Hortega's cells is observed even before there is any vascular or perivascular infiltration. At the same time the cells become hypertrophied, undergo changes in shape and become more distinctly argentophile. Bipolar and multipolar forms make their appearance. In older cases, the hypertrophy of the cells is more prominent than their multiplication. Hortega cells may take up an increased amount of lipoid and by losing their processes become changed into "lattice" cells ("gitterzellen"). Degenerative changes also occur in the cells.

As in the case of other neurotropic virus diseases, glia nodules are partly formed by multiplication of glia cells with or without neuroglia elements. They may be found together with astrocytes at the periphery of the perivascular round-celled infiltrations. They are also involved in the process of "cuffing" and play an essential part in the inflammatory reaction in Borna disease.

SEIFRIED, Oskar. (1931). Zur histologischen Klassifikation nichtitritiger Encephalitisformen der Haustiere. [The Histological Classification of non-purulent Forms of Encephalitis in domestic Animals].—*Arch. wiss. prakt. Tierhlk.* **63.** 167-180. [72 refs.]

The diseases could be divided into two main groups:—(a) encephalomyelitis showing elective neurotropic properties; (b) similar diseases in which the virus is organotropic. Under this scheme, Borna disease of horses, ovine encephalitis and enzoötic bovine encephalitis, which are probably identical with the equine disease, rabies, the paralytic disease of guinea pigs, human epidemic encephalitis and also cerebral forms of Heine-Medin disease in human beings (acute anterior poliomyelitis) would belong to the first group; enzootic encephalo-myelitis of horses ["encéphalite enzootique" of MOUSSU & MARCHAND (1924 & 1926)], the equine encephalitis described by FRÖHNER & DOBBERSTEIN (1924, 1925 & 1928), dog distemper, swine fever and fowl plague encephalitis would belong to the second group. The comparative histology, etiology and pathogenesis of each of the above diseases is discussed.

—. (1931). Enquête sur la rage. [The Inquiry regarding Rabies].—*Bull. Off. internat. Epiz.* **5.** 257-263. 1 chart. 5 tables.

This paper contains the official records of the number of animals attacked in Germany, Hungary, Roumania and Czechoslovakia during the year 1930.

- I. HURST, E. W., & PAWAN, J. L. (1931). An Outbreak of Rabies in Trinidad without History of Bites and with the Symptoms of Acute Ascending Myelitis.—*Lancet.* **221.** 622-628. [50 refs.]
- II. ANNOTATION. (1931). Epidemic Rabies in Man.—*Lancet.* **221.** 641.
- III. —. (1931). An Unusual Outbreak of Rabies.—*J. R. Army Vet. Corps.* **3.** 8-9.

I. The authors describe an outbreak of disease among the native population in Trinidad which they believe to be rabies, although there is no history of bites and the mode of transmission has not as yet been recognised.

The disease was first reported in human beings in 1929 and within a year 17 further cases occurred, all of which ended fatally. It is of interest to note that the last case of rabies to be recognised occurred in 1914 and that, with the quarantine and inspection since available, there was little opportunity for the importation of rabies.

The history of the human disease was unusual and in none of the affected persons was there either history or evidence of bites or injury. The lesions found were those of acute ascending myelitis.

Prior to experimental investigation, the local medical practitioners tentatively considered that the disease was acute poliomyelitis and support was given to this supposition because no sensory changes were observed in the earlier cases.

From a consideration of the evidence there appeared to be no reason to incriminate biting flies, mosquitoes or other insects as possible vectors.

The possibility that the vampire bat (*Phyllostoma superciliatum*) may be the vector is being investigated.

The authors give a detailed description of the clinical features observed. Towards the final stages, paralysis extended to the muscles of deglutition and respiration causing difficulty in swallowing, dyspnoea and death. The duration of illness was usually from four to eight days.

The experimental investigation has been carried out in London on portions of the spinal cord from case I and of different regions of the central nervous system of case II, received from Trinidad. Material from a bovine case was also dealt with.

Four monkeys (*Macacus rhesus*) were inoculated intracerebrally with 1 or 2 c.c. of a 10 per cent. suspension of cord from case II.

After incubation periods of 15, 17, 17 and 42 days respectively, these animals developed curious symptoms which were not apparently characteristic of rabies. When interfered with neither of them made any attempt to bite. Two of the monkeys did not show definite paralysis ; in the other two there was marked sleepiness accompanied by weakness of the legs rather than paralysis.

Animals inoculated with material from these monkeys developed typical symptoms of rabies ; following a preliminary stage of aggressiveness they gradually became weak and died.

The incubation period varied from 6 to 11 days and death always occurred within 48 hours of the first appearance of symptoms.

So far the disease has been passed through five generations of monkeys either by intercerebral or intraneuronal inoculation of unfiltered or filtered (Chamberland L1 bis) material.

After some initial difficulty, the monkey virus has been established in rabbits and the symptoms induced are similar to those of paralytic rabies.

In all the monkeys and in some of the rabbits, typical Negri bodies were present in the *cornu ammonis*.

The authors are now carrying out cross-immunity tests between the Trinidad virus and "virus fixe" and the final results of the work will be awaited with considerable interest.

From the results already obtained, there is apparently some degree of cross immunisation between the two viruses. The "virus fixe" protects against intracerebral inoculation with the Trinidad virus, but the Trinidad virus does not protect against the "virus fixe." Serum obtained from animals immunised with "virus fixe" neutralised both viruses to the same extent. The authors believe that there is no reason to doubt the close relationship between the two viruses.

The problem of the human disease is complicated by the existence of a disease in cattle, horses and mules.

It was first observed in these animals in 1925 and, from the symptoms and *post-mortem* appearances, was diagnosed as botulism. This diagnosis is said to have been confirmed by GRAHAM at Illinois and JACOBI at Minneapolis, but presumably only on data supplied to them from Trinidad and not as the result of experimental investigation or personal observation.

One of the authors (J. L. P.) has isolated *B. botulinus* from the liver and spleen of two affected cattle and also from samples of soil and water from "infected" pastures. [This is not, however, proof that botulism was responsible for the illness].

From the brain of a cow supposed to be affected with botulism, the authors have, however, isolated a virus similar to that found in the human cases and they have demonstrated typical Negri bodies in the *cornu ammonis* of a second cow.

[Unless evidence is obtained of actual infection in the bats, the manner in which this infection is spread is still an open question. The amount of material examined from the animal cases is very small and it will be interesting to hear the results of further work on the subject. There will be no difficulty in conceiving the spread of rabies to certain domesticated animals and human beings by blood sucking bats ; if it is subsequently proved that such a method of transmission does occur, we must add a hitherto unsuspected disease vector to our list. Certain unusual features have still to be explained such as the absence of the usual history attached to rabies infection and the atypical syndromes in both human beings and animals].

II. This refers to the investigations carried out by Hurst and Pawan (*supra*). It is pointed out that the last 20 years have been remarkable for the appearance of new virus diseases and also for an exaltation in virulence of known virus diseases, especially those which have an affinity for the nervous system.

III. Like II, this is a short article referring to the work of Hurst and Pawan.

BISANTI, Carlo. (1931). Utilisation éventuelle de la vaccination antirabique par les virus tués. [The Use of Dead Viruses for Vaccination against Rabies].—*Bull. Off. internat. Epiz.* 5. 121-130, 229-246 & 256.

During recent years this subject has been extensively investigated, but it is still impossible to form an opinion as to the value of vaccination with dead virus in practice because, in many cases, the number of observations is too small, while in others only laboratory experiments have been reported. Since artificial cultivation is not available as a means of testing virus with regard to its vitality, it is necessary to rely upon biological tests ; Bisanti concludes that a virus may be considered to be dead when a sufficiently large dose can be injected into the brain of a rabbit without producing any symptoms attributable to rabies.

A brief survey is given of the attempts made since 1889 (BABÈS and LEPP) to produce a non-virulent vaccine against rabies.

In order to bring together the available information a questionnaire was sent to the principal veterinary officers of 28 countries asking for information regarding the use of dead vaccines and for an expression of opinion as to the practical value of the method employed.

Replies were received from 28 countries. In eight cases no information was available as vaccination with dead virus had not been employed. The following positive information was obtained :—

ALGERIA.—3,800 dogs have been vaccinated with formalised vaccine and no cases of rabies have occurred in the vaccinated dogs, although 20 of them were bitten by dogs which were either infected with or suspected of being infected with rabies.

AUSTRIA.—During eight years, 437 dogs have been vaccinated experimentally with vaccines of the UMANO and DOI and LEDERLE types. In one case, posterior paralysis developed on the tenth day, but recovery was complete in three weeks.

GERMANY.—Six dogs have been vaccinated with the FERMI vaccine. One became infected when tested with street virus intramuscularly. Sixty dogs have been vaccinated with the UMANO and DOI vaccine. Three contracted rabies and seven became infected when tested with street virus at five to twenty-six weeks.

Two dogs have been vaccinated with chloroform-killed virus, but these have not yet been tested.

BULGARIA.—218 dogs have been treated with UMANO and DOI vaccine. One developed fatal paralysis three weeks after inoculation, but the brain of this dog was not infective for a leveret.

UNITED STATES.—A few dogs have been vaccinated with chloroform-virus. Carbolised vaccine has been used on a large scale and paralysis has occasionally developed. Vaccination is recommended only when there is a risk that rabies may spread.

FINLAND.—During the winter of 1929-30 the SCHNÜRER vaccine was used on 1,175 dogs on the Russian frontier. Three of them died of paralytic rabies and five which were bitten by rabid dogs escaped infection.

FRANCE.—Vaccination has not yet been employed officially, but the Algerian tests are being closely watched.

ITALY.—FINZI's carbol vaccine has been used for 2,114 dogs without mishap. Forty-four have

been tested at two, four and six months by instillation of infective material into the eye in minimal infective doses. "The results of the vaccination are recognised as insufficient."

JAPAN.—Vaccines killed by iodine and formol have been tried; the methods of UMANO and DOI and of KONDÔ have also been tested on a large scale with good results.

MOROCCO.—The vaccine of REMLINGER and BAILLY is used under official sanction, but no information is given as to the results obtained with it. A small number of experiments have been made with the Japanese vaccine.

POLAND.—The vaccines of SEMPLE, FERMI and of UMANO and DOI have been tested on 610 infected or suspected dogs. Five of them developed rabies.

PORTUGAL.—An insufficient number of dogs has been vaccinated to warrant conclusions.

ROUMANIA.—Thirty-one dogs, vaccinated with a formolised vaccine prepared from the brains of rabid dogs, resisted experimental infection.

Of 1,138 dogs vaccinated after they had been bitten, 31 developed rabies. MOTAS considers that, except in the case of those which have been severely bitten about the head, dogs that have been bitten should be vaccinated.

CZECHOSLOVAKIA.—Up to January, 1931, 84,358 dogs, 604 cats, 117 horses, 814 bovines, 39 sheep, 22 goats and 1,286 pigs have been vaccinated with formolised vaccine with satisfactory results. No accidents have resulted from the inoculation, but some cases of dumb rabies have occurred in dogs vaccinated after they have been bitten.

JUGOSLAVIA.—Vaccines prepared with ether, formol and phenol have been tested. The view is held that dead viruses are ineffective from the immunological point of view.

The general conclusions drawn are:—

That dead vaccines are harmless, but if given as a single injection only they produce a very low degree of immunity. The use of a series of injections such as is necessary to produce a useful degree of immunity is too costly. The use of dead vaccines has at present no practical value. They are still in the experimental stage.

In the discussion, HAGUIWARA described the Japanese police control of dogs and the manner in which the number of stray dogs is kept down.

REGO read a report regarding the occurrence of rabies in human beings in Portugal and produced figures to prove that, after vaccination of dogs had been undertaken according to the method of UMANO and DOI, the number of persons subjected to anti-rabic treatment showed a marked and continuous decrease.

The general resolution passed at the meeting was to the effect that rabies could be controlled by rigorous application of the classical sanitary precautions. Further observations are necessary before any reliable opinion can be formed regarding the value of dead vaccines.

KONDÔ, S. (1931). L'utilisation éventuelle de la vaccination antirabique par les virus atténusés et les virus tués. [Vaccination against Rabies by attenuated and killed Viruses].—*Bull. Off. internat. Epiz.* 5. 181-190. 18 tables. [88 refs.]

In an introduction, the author deals with the history of vaccination against rabies. In the second section of his paper, he reviews at length the methods which have been resorted to for the attenuation or destruction of the virus in the process of preparing vaccines. The third section of the paper is essentially statistical and shows the results which have been achieved in practice in Japan.

Out of 1,685,265 dogs vaccinated with the phenol-glycerol vaccine (Japanese vaccine), only 291 (0.017 per cent.) dogs have become infected. The author emphasises the fact that some of the vaccinated dogs were already in the incubative stage of the disease when treated. Over 16,000 cases of rabies have occurred in unvaccinated dogs between 1918 and 1930.

The method has led to a steady decline in the prevalence of the disease: whereas thousands of cases used to occur every year, only 64 cases were reported in 1930 throughout the whole of Japan. It cannot be denied that obligatory vaccination and the slaughter of stray dogs have been mainly responsible in reducing the incidence of the disease.

Evidence in support of the value of the Japanese vaccine has been forthcoming from other countries. The tendency of the vaccine to cause eczema and abscess formation has been emphasised by certain investigators, but in Japan such accidents have been altogether exceptional.

From Kondô's observations, temporary or fatal paralysis has apparently followed vaccination in 15 cases out of 190,788.

The attenuated Japanese vaccine is superior to the killed vaccines because the application of the latter is not practicable as too many injections have to be given. The objection to the use of formalised vaccine is the large amount of nerve tissue required for its preparation; a similar objection is raised to the ether-vaccine.

DALLING, T. (1931). **Further Field and Laboratory Observations in connection with Canine Distemper Prophylaxis.**—*Vet. Rec.* 11. 617-624. 7 charts. [3 refs.]

The author found that dried virus was more stable than liquid virus and that prolonged drying increased the stability; virus dried for 14 days remained viable for seven days at 37°C.

The dried virus-vaccine inoculation method has proved satisfactory and good results have also been obtained in the field and in the laboratory from the injection of two doses of vaccine without virus at an interval of 2-3 weeks; the efficacy of the latter method depends on the potency of the vaccine and the chance of exposure to natural infection within a short period after vaccination.

The author confirms the work of LAIDLAW and DUNKIN regarding hyperimmune serum and its prophylactic value when inoculated simultaneously with virus, but does not agree that the complement-deviating power of a serum is necessarily an indication of its protective power; the final test must be carried out *in vivo*.

He reports hopefully on field observations regarding the curative value of the serum.

HUTYRA, F. de. (1931). La prophylaxie de la peste porcine. [Protection against Swine Fever].—*Bull. Off. internat. Epiz.* 5. 21-34, 212-217 & 254. 4 tables.

The infectious nature of the disease and the fact that the virus is an obligatory parasite are the basal facts upon which protection against swine fever must rest. There are many points of resemblance between swine fever and rinderpest and control could, no doubt, be established by a policy of slaughter. There are, however, so many difficulties in the path of this policy that it is impracticable. The complete slaughter policy can only be applied to maintain freedom in countries where the disease is usually non-existent. An effort can, however, be made to reduce the losses to economic proportions and this can be achieved by protective inoculation.

The author outlines briefly the method used in Hungary and in other countries for the standardisation of anti-swine fever sera.

Statistics covering a period of several years are given regarding the use of serum-alone inoculation. While the results of serum-alone inoculation were satisfactory to a large extent, owing to the occurrence of natural infection in the animals while they were protected by the serum, the method was not invariably successful and definitely bad results were sometimes obtained. In some cases the bad results were considered to be due to the occurrence of swine erysipelas and other diseases.

Investigations carried out in Hungary, the United States, Germany and elsewhere, show that, when properly carried out, serum-simultaneous inoculation is of the greatest possible value.

The author discusses the relative merits of using local virus and virus obtained from laboratories, giving grounds favouring the use of virus from both sources. Statistics are given regarding the use of serum-simultaneous inoculation in Hungary from 1926-1929. These indicate that, while a considerable degree of success is achieved, some unexplained failures occur and they are the subject of investigation.

It is impossible to make any hard and fast rules regarding the advisability of carrying out simultaneous inoculation on premises that are free from the disease.

In the discussion which followed this paper, LOURENS stated that the slaughter of a large number of the pigs in Holland between 1914 and 1918 freed the country from the disease. It reappeared in 1920, but it has not assumed the characters of an epizootic. In these circumstances, active immunisation is not advisable since it has been possible to control the disease by administrative measures coupled with the use of serum-alone. Some experience has shown that variable results are likely to follow the application of serum-simultaneous inoculation and, until greater standardisation of virus and serum is possible, it is not advisable to apply the method in countries where there is only a light infection.

GERLACH gave the following interim report of results obtained in Austria by MICHALKA :—

Serum-simultaneous inoculation promptly suppresses an outbreak. In 76 per cent. of cases, it has been possible to demonstrate the virus in hæmorrhagic lymphatic glands of pigs 10 months after recovery. This gives grounds for the belief that immunity against swine fever is an "immunity of infection." On premises where the infection runs a chronic course, results are due to the large number of carriers of the virus.

CABOT expressed the view that the variable results frequently obtained by the serum-simultaneous method are due to differences in the susceptibility of the pigs. Another objection to this method is that it creates "carriers."

REGO spoke in favour of the method.

LECLAIRCHE expressed the opinion that vaccination should only be carried out on infected premises, since active immunisation produces "carriers."

The committee reached the following conclusions :—

In countries where the disease only occurs in a sporadic manner, police control and slaughter are indicated.

In heavily infected countries, police control coupled with passive immunisation should be put into force.

The local virus may be used in serious outbreaks for serum-simultaneous inoculation, but serum-simultaneous inoculation should be subject to rigid control because it is responsible for the production of "carriers." All recovered pigs should be kept under strict supervision until they are slaughtered.

RICE, J. P. (1931). **Avian Diphtheritic Enteritis and Swine Fever.**—*Vet. J.* 87. 39-42
2 figs.

The author describes a diphtheritic enteritis in fowls occurring in the ileum and anterior portion of the large intestine. The wall of the intestine was considerably thickened and the mucosa was covered with a soft yellowish false membrane. Distinct "button" formation was also observed.

According to Rice, diphtheritic enteritis in poultry is sometimes caused by the virus of fowl pox, but no experimental proof is furnished in support of this contention.

The diphtheritic lesions found in fowls were said to resemble those of swine fever, but from the description given they would appear to be more akin to the lesions frequently associated with the chronic form of swine fever and usually attributed to the action of secondary bacterial invaders.

A saline suspension of liver and intestines of an affected fowl was passed through a Berkefeld filter and 5 c.c. of filtrate was inoculated subcutaneously into an apparently healthy pig.

All possible precautions were taken to guard against accidental infection with swine fever.

The pig died on the fourteenth day and autopsy revealed hæmorrhagic lobar pneumonia, gastro-enteritis and petechiae in the kidneys.

Blood from this pig was passed through a Berkefeld filter and the filtrate was inoculated into a second pig. This pig died on the twenty-sixth day. Autopsy showed necrotic pneumonia in the right lung, enlargement of the mesenteric glands, ulceration of the cæcum and colon and petechiae in the kidneys.

In a second experiment, six fowls were inoculated with filtered swine fever virus and one fowl died on the ninth day. Autopsy showed acute peritonitis and enteritis with serous exudation into the body cavity.

SHU, Shupe. (1931). **Experiments on attenuating Hog Cholera Virus with Chloroform.**—*Rep. New York State Vet. Coll. for 1929-30.* 167-173. [15 refs.] Albany: J. B. Lyon Company.

A modification of KELSER's method of attenuating rinderpest virus with chloroform was employed in these experiments.

The spleens or lymphatic glands were taken from pigs acutely ill with swine fever; the fat and fascia were removed and the organs were immersed in 5 per cent. phenol for 15 minutes. After three rinsings in distilled water, they were stored for 24 hours in a refrigerator before being finely ground in a mortar. To each gramme of this tissue, 4 c.c. of normal saline solution containing

variable amounts of chloroform were added and the product was finally strained. Vaccines containing from 0·75-4·0 per cent. of chloroform were thus obtained and were tested on susceptible pigs. In most cases swine fever developed and the pigs died. As, however, very few animals were available and only a small range in the proportion of the virus and chloroform were covered, these results do not condemn the method. The author considers that further tests with different strengths of chloroform and longer exposures of the virus to it will be worth carrying out.

DAUBNEY, R., & HUDSON, J. R. (1931). Enzootic Hepatitis or Rift Valley Fever. An undescribed Virus Disease of Sheep, Cattle and Man from East Africa.—*J. Path. Bact.* 34. 545-579. 9 tables. 6 charts, 3 plates. [12 refs.]

Experience has shown that the best period for lambing in East Africa is October to November, i.e., just before the short rains.

In 1930, owing to unusual distribution of rainfall, arrangements were made for lambing to take place in July and August on a farm of some 30,000 acres at 5,500 to 6,000 ft. above sea level in the Rift Valley.

The farm had not previously been troubled with major sheep diseases. Prior to the beginning of lambing, abortions occurred; investigation showed that these were not due to "blue-tongue", as was at first suspected. Shortly after lambing started, deaths occurred among the lambs and the mortality reached a very high figure. The deaths occurred in lambs from three to seven days old; the animals rarely survived 24 hours after the onset of symptoms.

Coincidentally there was a marked extension of the abortions accompanied by a high death rate in the ewes. By the second week in August 3,500 lambs and 1,200 ewes were dead.

By this time investigation had shown that the illness in the ewes and lambs was essentially the same; abortion was a frequent sequel to recovery in the ewes. The surviving animals were moved to land at about 7,000 to 8,500 ft. above sea level and the deaths ceased within a week. Some animals left on the lower land continued to be attacked and deaths occurred as late as December. *Post-mortem* examination appeared to indicate at first that the diseases in the ewes and lambs were distinct, but it was shown experimentally that this could be accounted for by the difference in the rapidity with which the disease ran its course. In lambs the most striking lesion was extensive focal necrosis of the liver. The foci were small and were scattered throughout the organ. They showed a tendency to coalesce, but there were no large, sharply defined necrotic areas.

In ewes, the liver presented a mottled appearance due to the presence of pin-head, reddish-brown spots. Microscopical examination showed that this appearance was actually due to the presence of ill-defined necrotic foci. In a few cases well-defined necrotic foci were found. The spleen, heart and kidneys showed petechial or more extensive haemorrhages. Congestion of the mesenteric blood vessels was pronounced and a varying amount of hyperæmia could be found in different parts of the intestine. The lymphatic glands were enlarged and moist and frequently showed haemorrhages.

The intestinal contents were sometimes "tarry" from the presence of blood but this may have been a complication.

Post-mortem decomposition was very rapid. Experiments showed that a virus was present in the blood, liver and spleen and that it regularly passed through Chamberland filters up to the L11 grade.

The virus can be kept in ordinary citrate solution at room temperature for a week and, in oxalate-carbol-glycerin at about 5° C., it retains its vitality and virulence for many weeks. At about 20 weeks it was still alive but attenuated in virulence.

The virus is precipitated with all the protein fractions obtained by salting out with ammonium sulphate.

Sheep, goats and cattle can be infected, but in the small number of experiments carried out, the goats and the cattle recovered.

During the investigation, four Europeans and a number of natives developed a dengue-like disease which ran its course in about four days.

A small number of experiments with a horse and some pigs yielded negative results. The disease is certainly not transmissible by simple contact, and the available evidence tends to incriminate

a mosquito, *Taeniorhynchus brevipalpis*.

The histological changes associated with the disease are best seen in specimens taken from cases which have not died shortly after the onset of illness.

The kidneys show a definite tubular nephrosis. At the beginning of the reaction the blood shows an increase in the proportion of polymorphonuclear leucocytes. The number begins to fall sharply and myelocytes and metamyelocytes appear. At the time of death the white corpuscles are almost all myeloblasts and lymphocytes. The liver lesion is a focal degeneration of liver cells followed by an invasion by phagocytes. Examination of the liver cells, individually, shows that they bear a striking resemblance to the "Councilman lesion" of yellow fever and bodies make their appearance which with Mann's stain bear a striking resemblance to Negri bodies.

NIESCHULZ, O., BOS, A., & TARIP. (1931). Uebertragungsversuche mit geflügelpest und *Stegomyia aegypti*. [Experiments on the Transmission of Fowl Plague by *S. aegypti*].—*Zbl. Bakter. I. (Orig.)*. **121**. 413-420. [5 refs.]

Preliminary experiments were carried out to ascertain at which stage of the symptoms the virus of fowl plague is present in the peripheral blood of affected birds. It was found that the virus is present in the blood several hours before death and that mosquitoes freed in proximity to affected fowls would always take up enough virus between the beginning of the period of depression, which occurs in the course of the fowl plague syndrome, and the time of death. From the very numerous experiments which are described, it was found that, as shown by the result of the intramuscular inoculation of crushed mosquitoes into susceptible fowls, the virus can be carried for as long as four days and sometimes for as long as 68 days, but that it dies out in the body of the fly after this interval.

Experiments, carried out to ascertain if fowl plague can be transmitted when these mosquitoes are taken from affected fowls and are put to feed on healthy ones, all yielded negative results, even when the interval was only a matter of a few seconds. It is therefore evident that *S. aegypti* does not transmit fowl plague.

PURCHASE, H. S. (1931). A Study of Cross-Immunity with Viruses of Fowl Plague and Observations on the Duration of Immunity.—*Brit. J. Exp. Path.* **12**. 199-201. [3 refs.]

The author carried out cross-immunity tests with seven strains of the fowl plague virus; these consisted of three English strains, one French, one Dutch, one Egyptian and one Palestinian strain. He encountered considerable difficulty in immunising fowls against fowl plague virus; a report on this work has recently been published [see this *Bulletin*. **1**. 133].

Prior to their use for the cross-immunity tests, the immune fowls were subjected to an inoculation with the virus against which they had been vaccinated. The test dose of virus consisted of 0.25 c.c. of a saline suspension of liver obtained from a fowl which had died from plague. The cross-immunity tests produced no evidence of immunologically distinct strains of fowl plague virus.

It would appear from observations made on four fowls that the immunity resulting from artificial infection is of short duration. All these fowls had previously resisted inoculation with the virus, but died of plague when retested after intervals of 32, 52, 62 and 154 days respectively.

[It frequently happens that fowls which are able to resist gross natural infection succumb rapidly to intramuscular inoculation with a minute dose of virus.

In the opening paragraph of this article the author states that there are two immunological types of the swine fever virus, namely the European strain and the East African strain.

The disease known as "East African swine fever" was first studied by MONTGOMERIE [(1921). *J. Comp. Path. & Therap.* **34**. 159.] who proved that the causal agent is a filter-passing virus.

There was strong circumstantial evidence that the wart-hog (*Phacochoerus*) was an important factor in the dissemination of infection, but there does not appear to be any experimental basis for the statement that the causal agents of the African disease and of swine fever or hog cholera in Europe and America are merely different strains of the same parent virus. All available evidence indicates that the East African disease is a separate entity.

Furthermore, extensive work carried out in America in connection with the preparation of immune serum has failed to prove the existence of immunologically distinct strains of the swine fever virus].

KLIGLER, I. J., & ASCHNER, M. (1931). Demonstration of Presence of Fowl Pox Virus in wild caught Mosquitoes. (*Culex pipiens*).—*Proc. Soc. Exper. Biol. N.Y.* **28. 463-465.**

Kligler and others have already proved [(1929). *J. Exp. Med.* **49**. 649.] that mosquitoes can transmit fowl pox infection from affected to healthy chickens kept in separate cages in one room. Kligler and Aschner [(1929). *Brit. J. Exp. Path.* **10**. 347.] further showed that the virus was contained in the proboscis and did not enter the body of the mosquito.

In the present paper, they record a number of observations on the activities of mosquitoes in spreading fowl pox to chickens placed in a room containing infected birds. Material obtained by crushing the heads of mosquitoes found in the chicken house proved to be infective when rubbed on to scarified areas on the wattles of healthy fowls. Similar material obtained from 360 mosquitoes found in a room near the animal house also produced fowl pox in healthy birds when applied in this way.

It is clear from these observations that mosquitoes can transmit fowl pox in natural circumstances.

HINSHAW, W. R. (1931). Infectious Laryngotracheitis of Fowls.—*Vet. Med.* **26. 324-327. 1 fig. [16 refs.]**

Infectious laryngotracheitis is a respiratory disease of fowls which occurs in the North American continent and all available evidence indicates that a filter-passing virus is the causal agent; fowls of all ages are susceptible to infection.

The mortality varies considerably in different outbreaks; in 75 outbreaks studied by Hinshaw, the average mortality was 11-15 per cent. One attack of the disease is said to produce immunity.

The most characteristic symptom occurs in connection with respiration. The affected bird extends its neck, opens its mouth and raises its head during inhalation. The laboured breathing is interrupted by fits of coughing during which blood-stained mucus is expectorated.

The course of the disease varies within wide limits, but it rarely exceeds 21 days.

Autopsy of uncomplicated cases shows that pathological changes are confined to the respiratory tract. There is a varying degree of inflammation in the trachea, in the superior and inferior larynx and occasionally in the bronchi. The trachea usually contains an accumulation of blood-stained muco-purulent exudate which, in the later stages, becomes caseated and adherent to the mucous membrane.

In advanced stages the exudate occasionally blocks up the laryngeal openings and causes death by asphyxiation.

So far no reliable method for controlling the disease has been found.

GRAHAM, R., THORP, F., Jr., & JAMES, W. A. (1931). A Filterable Virus-like Agent in Avian Laryngotracheitis.—*J. Amer. Vet. Med. Ass.* **78. 506-517. 7 figs. 1 table. [5 refs.]**

The authors inoculated fowls with bacteria-free filtrates prepared from composite laryngeal exudates and body tissues of fowls naturally infected with laryngotracheitis.

Subacute inflammatory changes were produced in the larynx and the infectious nature of the condition was proved by repeated transfers to susceptible fowls. The acute type of laryngotracheitis was not set up experimentally.

HAMEL. (1931). État actuel de la question de la psittacose et de la lutte contre cette maladie. [The Position regarding Psittacosis and the Struggle against this Disease].—*Bull. Off. internat. d'Hyg. Publ.* **23. 1047-1058. [6 refs.]**

The author gives an account of the geographical distribution of recorded cases of the disease and points out that no case has ever been certified in Asia or Australia. Various countries have restricted or forbidden the importation of birds belonging to the parrot family. In Germany the effect of a complete embargo has been to arrest the incidence of the disease; in the United States the adoption of controlled importation methods has not prevented its reappearance; in England a number of cases of the disease occurred before restrictions were imposed. There is no evidence to show that an epidemic would not occur again if the regulations were rescinded.

In view of this knowledge, the permanent committee of the International Office of Public Hygiene draws the attention of the various countries to the importance of the control of parrot importations and recommends that present prohibitions be maintained until December, 1931, pending more complete investigations regarding the possibility of a reappearance of the disease in birds.

RIVERS, T. M., BERRY, G. P., & SPRUNT, D. H. (1931). **Psittacosis. I. Experimentally Induced Infections in Parrots.**—*J. Exp. Med.* 54. 91-103. 8 text figs. [8 refs.]

RIVERS, T. M., & BERRY, G. P. (1931). **Psittacosis. II. Experimentally Induced Infections in Mice.**—*Ibid.* 105-117. 12 text figs. [8 refs.]

RIVERS, T. M., & BERRY, G. P. (1931). **Psittacosis. III. Experimentally Induced Infections in Rabbits and Guinea Pigs.**—*Ibid.* 119-128. 2 text figs. [5 refs.]

RIVERS, T. M., & BERRY, G. P. (1931). **Psittacosis. IV. Experimentally Induced Infections in Monkeys.**—*Ibid.* 129-144. 30 text figs. [4 refs.]

The authors have investigated the experimental reproduction of psittacosis in parrots, monkeys, rabbits, guinea pigs and mice.

A clinical picture comparable to that seen in human psittacosis pneumonia was obtained only in monkeys, and rabbits ; in the former, after intratracheal injection or intranasal instillation of the virus and in the latter after intratracheal injection. Lung lesions were not produced in monkeys or rabbits by means of intracranial injections, nor were they ever observed in parrots or mice. These observations, combined with the fact that sputum from an infected human being was found to contain the virus, strongly support the theory that human infection takes place through the upper respiratory tract.

Parrots were found to be susceptible to the virus when introduced intranasally, intramuscularly or *per os* ; the virus can be recovered from the nasal secretion, blood, spleen, liver and faeces. The incubation period after injection appeared to vary between two and eight days ; the commonest clinical signs of the disease were loosened bowels, followed by diarrhoea and ruffled plumage.

Mice, injected intraperitoneally, suffered from loss of appetite and loss of weight and there were sometimes pre mortem convulsive seizures. Death occurred within 48 hours to three weeks after infection. Intracerebral inoculation resulted in a different clinical picture with marked nervous irritability, brain symptoms and convulsions ; animals died with the head retracted, the back arched, and the hind legs and tail extended. Passage of the virus increased its virulence for mice.

In parrots and mice, the most typical morbid change found was the presence of necrotic foci or infarctions in the liver. They were sometimes absent from those mice in which the disease had run a rapid course.

In rabbits and guinea pigs, intracranial injection resulted in high fever, inappetance, loss of weight and sometimes convulsive seizures and death. The intratracheal injection of rabbits resulted in a psittacosis pneumonia. Virus was shown to be present in the blood, liver and spleen of rabbits and the liver and spleen of guinea pigs ; there was apparently no loss of virulence from passage through these animals.

Intratracheal injection appeared to be a sure method of infecting monkeys and 50 per cent. were infected by intranasal instillation. Both methods resulted in a pneumonia running a parallel course to that seen in human infections. Passage experiments indicated that the virus is affected to the extent that transmission from monkey to monkey becomes increasingly difficult ; this again is analogous to the disease in human beings who are readily susceptible to infection from parrots, but are scarcely susceptible to infection from other human beings.

Immunity tests showed that recovered parrots and rabbits are actively immune, but no appreciable degree of immunity was found in recovered mice or monkeys. [Throughout the experiments, one human and one parrot strain of virus were used. The authors state that the two are immunologically similar, but they have only shown that recovery from infection with the parrot or human strain protects against re-infection with the parrot strain].

A careful search was made in the tissues for the " minute bodies " variously described by LEVINTHAL, by LILLIE, and by COLES. These bodies were found in the majority of cases occurring in parrots and mice ; they were not found in rabbits or monkeys, but were found in liver and spleen

smears from mice infected with monkey tissues. The authors consider that these bodies demand serious consideration as being the possible etiological agent of the disease.

FISHER, H. R., & HELSBY, R. J. (1931). **Three Cases of Psittacosis with two Deaths.**—*Brit. Med. J.* May 23rd. 887-891. [2 refs.]

Three cases of psittacosis in human beings are described in which case-to-case infection occurred in at least one instance. The source of infection proved to be a sick budgerigar nursed by the first patient. Patient No. 2 was infected either directly from the sick bird or, more probably, by contact with patient No. 1 ; patient No. 3, however, was a nurse in attendance on the other two during their illnesses and had no contact whatever with the infected bird.

Patients Nos. 2 and 3 died and RUSSELL gives an account of necroscopical examinations. BEDSON investigated the bacteriological aspect of the disease and showed by mouse inoculations that the budgerigar, patient No. 2 and patient No. 3 were all infected with psittacosis virus.

In conclusion, it is pointed out that psittacosis may still occur in this country, that birds other than parrots may cause psittacosis in man and that human case-to-case infections may occur.

TORRES, C. Magarinos. (1931). **Oxychromatic Degeneration ("Intranuclear Inclusions") in Yellow Fever.**—*Mem. Inst. Oswaldo Cruz, Rio de Janeiro.* 25. 148-211. 9 tables, 3 plates in colour. [46 refs.] [In English].

The presence of "cellular inclusions" within the nuclei of the liver cells is the only specific histological abnormality which the author has been able to discover in tissues from animals or men infected with yellow fever. The change is more distinct in material from experimentally infected monkeys than in that from human sources.

The author details at considerable length his opinion as to the nature of the changes produced in the nuclei by the virus.

ARAGAO, Henrique de Beaurepaire. (1931). **Vaccination with Serum-virus in Yellow Fever.**—*Mem. Inst. Oswaldo Cruz, Rio de Janeiro.* 25. 220-226.

Immunisation against yellow fever has been effected by :—(1) the use of an antiserum ; (2) the use of vaccines prepared from the organs of infected monkeys ; and (3) serum and virus inoculation.

The author reports that he has been using the third method for some time. The serum may be obtained either from a human being or from a monkey which has passed through an attack of the disease. Virus is obtained from monkeys infected by mosquito bites. If the virus is dried and stored at a low temperature, it retains its immunising value for a year.

The serum injection is followed at an interval of 24 hours by the injection of virus, a second dose of virus being given 12 days later.

Details of some experiments with monkeys are given.

The author expresses the hope that this method of inoculation with serum and virus will be of value for the immunisation of human beings.

ZINSSER, Hans, & CASTANEDA, M. Ruiz. (1931). **Studies on Typhus Fever. VII. Active Immunisation against Mexican Typhus Fever with dead Virus.**—*J. Exp. Med.* 53. 493-497. 1 chart. [4 refs.]

ZINSSER, Hans, & CASTANEDA, M. Ruiz. (1931). **Studies on Typhus Fever. VIII. Ticks as a Possible Vector of the Disease from Animals to Man.**—*Ibid.* 54. 11-21. 4 charts. [5 refs.]

In a previous article [see this *Bulletin*. 1. 135.], the authors reported the successful protection of guinea pigs against European typhus fever by the inoculation of formolised suspensions of Rickettsia obtained in sufficient amount from the peritoneal exudate of experimentally-infected, scorbutic

guinea pigs. They now report similar success with experiments on protection against Mexican typhus fever. The protective inoculations resulted in an immediate though brief temperature reaction which was apparently due to the toxicity of the dead organisms.

In continuation of their work on possible parasitic vectors of the disease, the authors have now shown that several species of ticks can harbour the virus for at least 14 days after rectal infection. Attempts to infect guinea pigs by allowing such ticks to feed on them yielded negative results ; it was necessary to employ actual inoculation with extracts made from the crushed ticks.

They conclude that ticks, as well as bedbugs and fleas, are possible vectors of infection between animals and man. An attempt to infect two dogs with Mexican typhus fever was unsuccessful and the authors consider that rats and mice are the most likely animal sources of infection.

DISEASES CAUSED BY METAZOAN PARASITES.

MASCHERONI, Ettore. (1931). L'hypoderma bovis. Suo ciclo evolutivo e vari methodi consigliate per debellare le nostre stalle da questo parassita. [Hypoderma bovis. Its Life History and the Methods that have been recommended for its Control].—Nuovo Ercol. 36. 284-288.

A general account of ox warble flies, the economic loss they cause and a discussion on control measures.

GILDOW, E. M., & HICKMAN, C. W. (1931). A new Treatment for *Oestrus ovis* Larvæ in the Head of Sheep.—J. Amer. Vet. Med. Ass. 79. 210-216. 3 text figs. [4 refs.]

This paper describes an attempt to treat sheep for these relatively inaccessible parasites by injecting 3 c.c. of a mixture of equal parts of carbon bisulphide and a thin mineral oil into the middle meatus of the nose. If the head of the sheep is held with one side downwards and the nasal septum horizontal, the greater portion of the parasiticide will find its way into the infested sinuses. Two separate injections of 3 c.c. each of the mixture must be given, one for each side of the head. Trials which were conducted on the heads of 14 sheep soon after slaughter showed that 20 of the 23 larvæ on the treated sides were killed, while 22 larvæ were alive on the untreated sides. Results obtained in 21 living sheep were, however, less satisfactory as only six of the 16 larvæ on the treated sides were dead and nine living and one dead larvæ were found on the untreated sides. The purulent discharge from the sinuses of heavily infested sheep greatly interferes with the success of the treatment. It was observed that the presence of carbon bisulphide in the nasal passage did not kill the minute larvæ found there.

—. (1931). The Buffalo Fly Problem. Recent Developments.—J. Sci. & Indust. Res. Australia. 4. 126.

The fly has for some years been spreading slowly from North Australia towards Queensland and also, to some extent, in a westerly direction. A natural barrier apparently exists to the South near Darwin in plateau country where the aridity and other climatic conditions are unsuitable for its existence. The conditions along the coastal belt, however, are unfortunately suitable for its spread. Once it reaches the railhead, nothing can be done to prevent its rapid spread throughout the regions climatically suited to it. There is, therefore, a definite danger to certain important regions such as the dairying country to the north of Sydney.

Authorities having the necessary powers to declare quarantine lines and zones have made one or two attempts to stop the further eastward spread of the fly, but there are great difficulties in controlling a flying insect.

The Division of Economic Entomology of the Council for Scientific and Industrial Research, Australia, made a study last year of the eastward advance of the fly. The results obtained were of great importance and indicated the gravity of the situation. Two of the entomological staff of the Council—MACKERRAS and CAMPBELL—are surveying certain areas in collaboration with the State government authorities concerned, with a view to the proclamation of a new buffer zone to the east of the former quarantine line.

MCINTOSH, A. (1931). **The Brown Dog Tick.**—*North Amer. Vet.* **12.** No. 6. 37-41. 2 plates. 2 figs. [14 refs.]

This tick *Rhipicephalus sanguineus* has lately spread over certain parts of the United States and with a view to its eradication, the author, who is a zoologist at the Bureau of Animal Industry, gives a general account of its life history and distribution in the United States. He also gives a brief account of the best measures for its control.

The transmission by the brown dog tick of the following protozoa amongst dogs, either in nature or experimentally, has been established:—*Piroplasma canis*, *Hepatozoon canis*, *Trypanosoma cruzi*, *Trypanosoma christophersi*, anaplasms of cattle, anaplasms of dogs and the (filarioid) *Acanthocheilonema grassii* in the dog.

ROBERTS, F. H. H. (1931). **The Occurrence of a Beetle (*Onthophagus granulatus*) in the Stomach of Domesticated Animals.**—*Queensland Agric. J.* **35.** 171.

The occurrence of *Scarabaeidae* in the alimentary tract of human beings is common in India and Ceylon where it is known by vernacular names meaning "beetle disease." The author says that in Australia a dung beetle, *Macropocoris symbioticus* Arrow, lives in the anus of wallabies and "so far as the writer is aware this is the only published record of such beetles occurring in the intestinal tract of any animal other than human beings." He records the presence of the beetle *Onthophagus granulatus* in the stomach of the horse and calf.

In the first instance which was observed a horse had been ill for three weeks; little food had been taken and the bowels were not known to have functioned. At *post-mortem* examination, it was found that there was a perforation of the stomach and that the organ contained large numbers of the beetle.

Later, they were found in the paunches of calves which had died 6-12 hours after the first symptoms of illness. Details concerning the illness were not available, but it was not certain that the animals had died as the result of the infestation.

Infestation probably occurred as the result of the animals swallowing eggs, larvæ or adults, or by the active efforts of the adults themselves. Beetles of this or allied species can be observed clinging to the anuses of horses.

MORGAN, D. O. (1931). **On the Differential Diagnosis of the Larvæ of some Helminth Parasites of Sheep and Goats.**—*J. Helminth.* **8.** 223-228. 7 figs. [4 refs.]

The author has made a study of the points of difference in the morphology of the infective-stage larvæ of the common strongyloid worms of sheep and goats. The following are the most useful points mentioned in the paper:—*Oesophagostomum venulosum* and *Ghabertia ovina* are very characteristic, having long whip-like tails measuring 0.117 mm. to 0.13 mm. and a peculiar swelling at the anterior end of the oesophagus. This character makes it possible to distinguish the larvæ of worms which inhabit the large intestine from those of worms taken from other parts of the body. It is not possible, however, to differentiate between these two species.

The larvæ of *Strongyloides papillosus* may be identified by the character of the oesophagus, which is about half the length of the body, and by its bifid tail.

The sheathed infective-stage larva of *Nematodirus filicollis* has a very long tail and the extremity of the tail of the enclosed third stage larva has a characteristic short process which arises between a dorsal and a ventral lobe.

The larva of *Muellerius capillaris* has the familiar twisted tail and short dorsal process; that of *Dictyocaulus filariae* in its first stage has a knob-like anterior end and, in its infective stage, is usually enclosed in two sheaths.

The other larvæ mentioned are differentiated by the length from the tail end of the sheath to the tail end of the enclosed third stage larva. In *Bunostomum trigocephalum* this measurement is 0.09 mm. to 0.1 mm.; in *Hæmonchus contortus* it is 0.07 mm. to 0.084 mm.; in *Ostertagia circumcincta* it is only 0.04 mm. to 0.045 mm.; and it is stated that, according to VEGLIA's figures, the measurement in *Trichostrongylus extenuatus* is shorter still.

- I. PURVIS, G. B. (1931). Further Parasites of Domestic Animals in Malaya.—*Vet. Rec.* **11**. 761. [1 ref.]
- II. PURVIS, G. B. (1931). *Trichostrongylus axei* (Cobbold, 1879, Railliet and Henry, 1909) and *T. extenuatus* (Railliet, 1898, Ransom, 1907).—*Vet. J.* **87**. 385-386. [6 refs.]
- III. PURVIS, G. B. (1931). The Species of *Eurytrema* in Domestic Ruminants.—*Vet. Rec.* **11**. 583-584. 1 fig. [3 refs.]

I. This table reports the finding of five nematode species, five trematode species, one pentastome and the larvae of *Chrysomyia* in domesticated animals in Malaya. *Eurytrema rebelle* is recorded for the first time from the cat and *Armillifer moniliformis* is recorded in the intestine of the cat, probably being present as a result of the cat eating an infested snake, but not as a true parasite of the cat.

II. On comparing his own drawings of *Trichostrongylus axei* collected from the horse, with RANSOM's figures of *T. extenuatus*, the author could not find any difference and confirms LE ROUX's statement that the two are morphologically identical. [The identity of these two species was the subject of a recent paper by NAGATY (see this *Bulletin*. **1**. 228)].

III. From the examination of a large number of flukes belonging to the genus *Eurytrema*, collected in Malaya from the pancreatic ducts, bile ducts and duodenum of *Bos indicus*, it is concluded that *E. pancreaticum* and *E. dajii* are one and the same species. Particulars of size and shape are given; the variation in the supposed differences form a continuous series between the two species. *E. dajii* Bhaleræ, 1924, should therefore be regarded as a synonym of *E. pancreaticum* (Janson, 1889) Looss, 1907.

- I. OSERSKAYA, B. N. (1931). *Thelazia erschowi* n. sp. ein neuer Nematode des Schweines. [*Thelazia erschowi* n. sp. a New Nematode of the Pig].—*Tierärztl. Rdsch.* **37**. 656-657. 1 table. 8 figs.
- II. DICKMANS, G. (1931). Two New Lungworms from North American Ruminants, and a Note on the Lungworms of Sheep in the United States.—*Proc. U.S. National Museum.* **79**. Art. 18. 1-4. 12 figs. on 2 plates. [5 refs.]
- III. DICKMANS, G. (1931). Two New Species of Nematode Worms of the Genus *Ostertagia* from the Virginia Deer, with a Note on *Ostertagia lyrata*.—*Proc. U.S. National Museum.* **79**. Art. 6. 1-2. 12 figs. [10 refs.]
- IV. ANTIPIN, D. N. (1931). *Cooperia surnabada* n. sp. aus dem Dunndarm des Rindes, Aserbaidsjans. [*Cooperia surnabada* n. sp. from the Small Intestine of Cattle in Azerbaijans].—*Deutsch. tierärztl. Wschr.* **39**. 469-471.

I. *Thelazia erschowi* is the name given to a new species obtained from the eye of a pig. In 1928, ERSCHOW [ref. not given] found one female *Thelazia* in the eye of a pig at the Moscow abattoir and referred to it as *Thelazia* sp. A careful search subsequently made in 480 pigs in other parts of the country resulted in the finding of seven more animals infected with the same species. In no case were both eyes affected and the number of worms found was always small; one pig carried three worms, one carried two and the remaining five pigs carried only one each. The species is described from the two males and seven females which were found and a differential diagnosis is given to distinguish it from other members of the genus. [No mention is made of any injury to the eye.]

II. The author describes two new species of *Protostrongylus*, *P. stilesi* from the mountain sheep, *Ovis canadensis*, in Colorado and *P. macrotis* from the mule deer, *Odocoileus hemionus hemionus*, in Wyoming.

Examination of material, labelled *Synthetocaulus rufescens*, in the United States National Museum and of material similar to that described by CURTICE in 1890, has shown that the worm which CURTICE called "the hair lungworm, *Strongylus ovis pulmonalis* Diesing" is *Muellerius capillaris* Cameron, 1927, and, to quote the author's words, "*Protostrongylus rufescens* has so far not been found in an examination of material collected from sheep in the United States."

III. The two new species are named *Ostertagia odocoilei* and *O. mossi* and were found in the

fourth stomach of the Virginia deer, *Odocoileus virginianus*, from Pennsylvania. Short descriptions and figures of these two species are given together with a key to the 21 species of the genus. The author also corrects some points in the original description of *Ostertagia lyrata* from material which he collected from cattle in Louisiana.

IV. In the examination of a group of parasites collected from cattle in Transcaucasia, the author encountered a previously unrecognised species, here named *Cooperia surnabada*, which is described and differentiated from other members of the genus. Cervical papillæ have been demonstrated in this species and also in *C. oncophora*, so that their absence can no longer be regarded as a generic character.

- I. MEGGITT, F. J. (1931). On Cestodes Collected in Burma. Part II.—*Parasitology*. 23. 250-263. 6 figs. [17 refs.]
- II. PRICE, E. W. (1931). Four New Species of Trematode Worms from the Muskrat, *Ondatra zibethica*, with a Key to the Nematode Parasites of the Muskrat.—*Proc. U.S. National Museum*. 79. Art. 4. 1-13. 4 figs. [26 refs.]
- III. BRUMPT, E. (1931). Description de deux Bilharzies de Mammifères Africains, *Schistosoma curassoni* sp. inquir. et *Schistosoma rodhaini* n. sp. [Description of two Bilharzias of African Mammals, *Schistosoma curassoni* sp. inquir and *Schistosoma rodhaini* n. sp.].—*Ann. de Parasitol.* 9. 325-338. 3 keys. 7 figs. [2 refs.]

I. Out of 41 species mentioned in this collection, three new ones are of veterinary interest :—
(a) *Cotugnia fila* from the duck. The presence of a continuous group of testes and a cirrus sac which reaches the excretory vessels serves to distinguish this species from all other members of the genus.

(b) *Raillietina fecunda* from the duck. This species most closely resembles *R. clavulus* and *R. reynoldseae*, from which it is differentiated by a number of minor points.

(c) *Mesocestoides tenuis* described from a few strobilæ recovered from the faeces of a dog. A short description is given and mention is made of several points by which it may be differentiated from other members of the genus.

II. These four newly recognised species belong to four families of trematodes. *Psilostomum ondatrae* is the name given to a new species found in the liver of the muskrat and also in the proventriculus of a gull, *Larus californicus*. It resembles *P. varium* more closely than other members of the genus. A species found in the small intestine of the muskrat and the dog is called *Echinochasmus schwartzii*. Notes on the genus and special points for the differentiation of this species are given. Another new species found in the small intestine of the muskrat is called *Urotrema shillingeri*. This species, the description of which is based on a single specimen, is most closely related to *U. scabridum*. The fourth new species, *Paramonostomum pseudalveatum*, was found in the large intestine of the muskrat.

The various characters of the four species of this genus are tabulated and a key to all the known trematode species from the muskrat is appended.

III. *Schistosoma curassoni* was found in the veins of the mesentary and in the liver of an ox in the French Sudan. It was associated with a more or less severe schistosomiasis of the liver and intestine. This species closely resembles *S. mattheei*, eggs from the uteri of the two specimens of *S. curassoni* at the author's disposal being indistinguishable from those of *S. mattheei*. The identity of *S. curassoni* will not be determined until an examination of the ripe eggs has been carried out.

S. rodhaini is the name given to a new species which was obtained experimentally by WALRAVENS and LOMBART in the Belgian Congo by infecting a mouse with cercariæ from a mollusc found there.

The author gives a short account of the classification of schistosomes together with a key to the species of the genus *Schistosoma*.

- CALDWELL, F. C., & CALDWELL, E. L. (1931). The Rate of Loss of Hookworms in the Absence of Re-infestation.—*J. Parasitol.* 17. 209-222.

There is considerable diversity in the observations which have been made on the rate of

acquiring and of losing hookworm infestation in the human host. In order to throw more light on this point, the authors made a series of monthly egg counts on infected persons:—(1) an industrial group; (2) a rural group, and (3) an experimentally infected individual. Re-infestation of the industrial group was not possible during a nine months' period of study and was very unlikely in the rural group during a seven months' period of study. It was observed that, although a few individuals lost worms, the infestation in the majority remained stable during the period of observation.

The experimentally infested individual was under observation for four years, during which time there was no exposure to re-infestation, but no evidence of any loss of worms was obtained.

This is at variance with what has been observed in infestations of the dog with *Ancylostoma caninum* where the rate of loss is comparatively rapid.

MIYAGAWA, Yoneji, & OKADA, Ryoichi. (1931). **Biological Significance of the Lung Journey of Ancylostoma Larvae in the Normal Host.**—*Jap. J. Exp. Med.* 9. 151-207. 16 figs. 24 tables. [In English.]

In a previous communication, these authors have shewn that the larvae of *Ancylostoma caninum* are able to develop to a certain extent in the intestine of a rabbit, provided that they have already passed through the lung of their normal host. The series of experiments reported in the present paper shew that other tissues of the dog are also able to prepare the larvae for life in the intestine of the rabbit. Larvae collected from the lungs of dogs, one, three or six hours after intravenous injection, are able to develop in the rabbit's intestine up to a stage at which the sexes can be distinguished. Larvae obtained from the skin of dogs, 6, 12, 24 and 48 hours after infection by that route, also have the same power of development in the rabbit's intestine as those which have passed through the dog's lung. Larvae which had been inoculated directly into muscle tissue, liver, kidney, lung and a ligated portion of intestine were also able to develop in the rabbit's intestine. Emulsions of lung and other tissues of the dog were next tried and were found to have the same effect. Digestive juices of the stomach and of the intestine were also effective in preparing the larvae for life in the abnormal host. Ingesta taken from the stomach or intestine, however, did not have this effect, nor did artificial digestive juices. It is concluded that the tissues of the normal host (particularly the lung tissue) have an effect upon the mature third stage larva of *Ancylostoma caninum* which renders it able to develop almost to the adult stage in the rabbit.

WELLS, H. S. (1931). **Observations on the Blood Sucking Activities of the Hookworm *Ancylostoma caninum*.**—*J. Parasit.* 17. 167-182. 1 table, 1 text fig. [6 refs.]

Some of the early observers considered the anaemia of ancylostomiasis to be due to loss of blood, but general opinion subsequently changed and until recently it has been thought that other causes must be responsible.

The observations recorded in this paper were carried out on 20 dogs of various ages and degrees of infestation.

The preparation for the examination is a complicated procedure and is described in detail. The dog is completely anaesthetized and a loop of the small intestine is withdrawn from the abdominal cavity and held in a special clamp; this prevents muscular action and does not interfere with the blood supply of the part; microscopical examination is, in consequence, facilitated. It was observed that, in order to obtain a free flow of blood, the worm pushes its way between the villi and buries its head in the superficial layers of the mucous membrane. The blood is drawn in by the sucking action of the oesophagus, the rhythmical movements taking place at the rate of 120 to 250 per minute. During this process the intestine of the worm rapidly fills and the anal end of the canal is seen to become distended with blood. A forcible contraction of the muscles then occurs and a droplet of blood suddenly appears at the anus. The process of sucking as seen under the microscope is described in great detail.

The presence of soft tissue stimulates the sucking movements. Isolated worms immersed in blood will not suck readily unless attached to soft tissue.

Following the death of the dog, worms release their hold in a few minutes to seek a new point

of attachment, but in the living animal, when blood is flowing freely, they may remain attached at one point for hours.

The ejection of blood droplets occurs at intervals varying from a fraction of a second to 15 minutes or more and it is estimated that, on an average, each worm will withdraw 0.84 c.c. of blood in 24 hours. As several hundreds of worms may be found in one dog, the extraction of the blood alone may account for the anaemia. The blood ejected from the anus does not appear to have undergone any digestive changes and the reason for the very active blood sucking habit of this parasite is not apparent. Presumably the blood passes through the intestine at such a rate that there is no time for digestive processes to take place and, possibly, the parasite can only utilize simple diffusible substances already prepared for the consumption of the host. It is reasonable to suppose that other species of the genus *Ancylostoma* suck blood as also may those belonging to the closely allied genus *Necator*.

WETZEL, R. (1931). On the Feeding Habits and Pathogenic Action of *Chabertia ovina* (Fabricius, 1788).—*North Amer. Vet.* **12**. No. 9. 25-28. 1 fig. [11 refs.]

Observations were carried out on a large number of these worms in sheep killed at the Beltsville Experimental Station. It is usually impossible to find any visible lesions, but on sectioning the part of the mucous membrane where a worm is attached, it is seen that a portion of the glandular layer has been drawn into the buccal capsule and that the lining epithelium of that part has disappeared; the mucosa and the submucosa are infiltrated with lymphocytes and eosinophiles. Of the tissue which is drawn into the buccal capsule, that portion towards the base of the capsule is seen to have lost its structure, probably on account of the histolytic action of the dorsal cesophageal gland. The ingestion of blood is considered to be merely incidental and unimportant. The worms evidently have the habit of loosening their hold on the mucous membrane and moving from place to place; in a heavy infestation, a considerable area of the intestine may be damaged in this way. Dilatation of the veins and separation of the connective tissue elements in the submucosa were observed and were thought to be due partly to the toxic action of the parasites.

COUTELEN, F. (1931). Présence, chez les hydatides échinococciques, de cellules libres à glycogène et à graisses. Leur rôle biologique possible. [The Presence in Hydatid Cysts of Free Cells containing Glycogen or Fat. Their possible Biological Importance].—*Ann. de Parasitol.* **9**. 97-100. 4 figs. [4 refs.]

COUTELEN, F. (1931). Histogenèse des cellules libres, à glycogène et à graisses, des hydatides échinococcique. [The Histogenesis of Free Cells containing Glycogen or Fat in Hydatid Cysts].—*Ibid.* 101-108. 1 fig.

The proliferous membrane of the hydatid cyst is usually thought to be without definite structure. The methods of staining employed by the author have shown that the membrane is composed of individual cells, some containing glycogen or fat and finally becoming free in the hydatid fluid. Those cells which contain much glycogen contain little fat and *vice versa*. It has been noticed that, when the sterile contents of a cyst are left for some time at room temperature or in a refrigerator, there is a progressive disappearance of cells containing glycogen along with an increase of those containing fat. Previous observers have concluded that *Fasciola hepatica* is able to split glycogen into fatty acids and carbon dioxide and thereby to obtain the energy for its anaërobic existence, a process which has been ascribed to the activities of certain special cells. The observations here recorded show that cestodes are able to carry on the same process and that, in a like manner, it is associated with special cells.

In his second paper, the author describes the development of the free cells. These are first seen to be scattered here and there in the proliferous membrane in the form of small star-shaped bodies fixed to the adjoining elements of the membrane by long protoplasmic arms. At this stage they contain glycogen only, but in a more advanced stage, when they have grown to a diameter of 10-12 μ fat globules may also be seen. As the number of fat globules increases, the cells lose their stellate shape and finally become free in the hydatid fluid. Their ultimate fate is not known.

SINITSIN, D. F. (1931). A Glimpse into the Life History of the Tapeworm of Sheep, *Moniezia expansa*.—*J. Parasit.* 17. 223-227. 7 figs.

This paper gives a detailed description of the structure of the egg of *Moniezia expansa*, together with observations on the changes which take place between the time when it is voided by the sheep and the 45th day of its free existence.

The outer shell of the egg is described as being hard and non-elastic, but permeable to moisture; the inner shell is soft and fibrillar, the oily globules between the two forming a thick intermediate coat. This oily coat is very effective in preventing loss of water from the inner parts. When the egg is placed under dry conditions, a certain shrinkage results and the two layers of shell come into closer contact with each other causing the oil globules to run together and form an almost continuous layer. This prevents any further loss of water.

The pyriform apparatus is found to be permeable to moisture and soluble in digestive juices, even in saliva. An arrangement is described whereby food material is thought to be brought from outside the pyriform apparatus to the hexocanth embryo. This consists of two protoplasmic and nodular strings, one of which passes down each horn, and of two granular cells which belong to only one of the horns. The strings pass from the compartment containing the hexocanth embryo to the cap at the ends of the horns.

Eggs kept in a moist chamber were examined daily for a period of 45 days and it was noticed that the pyriform apparatus, which at first lies free in the egg, becomes attached to the shell through the cap at the ends of the horns. The cap gradually becomes disc-shaped and later ring-shaped, and the horn which is provided with the two granular cells becomes spirally twisted round its fellow.

The shell of the egg becomes very fragile so that it breaks at the slightest touch and frees the pyriform apparatus. When this happens the two horns twist on one another still further. It is noticed, however, that the horns untwist in the presence of moisture and it is thought that this constitutes a boring mechanism by means of which the pyriform apparatus is able to fix itself. The requisite conditions for boring occur in the mucous membrane lining the respiratory tract and experiments show that, in the mucous of the trachea, the capsule is dissolved in less than 30 minutes and the hexocanth embryo is liberated. It is presumed that it reaches the intestine by the aid of the circulatory systems. [Much of this account is speculative.]

SIMMS, B. T., & SHAW, J. N. (1931). Studies of the Fish-Borne Tapeworm *Dibothrium cordiceps* Leidy.—*J. Amer. Vet. Med. Ass.* 79. 199-205. 3 tables. [4 refs.]

Heavy losses have occurred among trout in a certain lake in Oregon, sick and dead fish being found in considerable numbers along the shores. On examination, the dead fish were all seen to be infested in the peritoneal cavity with the larvæ of *Dibothrium cordiceps*, the numbers of the parasites in each fish varying from 12 to more than 50. Many of the encysted larvæ were surrounded by an inflammatory zone while others were embedded in masses of necrotic tissue. Peritonitis was observed in every sick or dead fish, and its severity appeared to correspond to the number of parasites present. The brook trout *Salvelinus fontinalis* and the silver salmon *Oncorhynchus kisutch* were the two species affected. Feeding experiments were carried out in order to determine the final host and larvæ were fed to one cat, one dog, three ducks, two raccoons and three gulls (*Larus occidentalis*). Two developing tapeworms were subsequently recovered from one of the gulls and were afterwards identified as *Dibothrium cordiceps*, but nothing was found in the other experimental animals.

CRAM, E. B. (1930). Pathological Conditions ascribed to Nematodes in Poultry.—*U.S. Dept. of Agric. Washington. Circular 125.* 1-10. 10 figs. [18 refs.]

This paper brings together many reports on the causation of pathological conditions by nematodes in poultry. The reports are dealt with under the following headings:—injury to eyes; respiratory changes; cachexia, anaemia and general toxic effects; paralysis or marked incoordination; effects on appetite; diarrhoea; inflammation of the digestive tract; nodule or tumour formation; stenosis; impaction or occlusion; haemorrhage and other damage to the circulatory system; obscure physiological changes and secondary infections as the result of nematode activity.

Various species of parasitic nematodes are involved and pathogenicity cannot be associated with any particular group.

MAROTEL. (1931). L'Anémie vermineuse. [Vermilion Anæmia. (Strongylidosis of Equines)].—*Rev. vét. milit.* 193-199.

GADIOU. (1931). Note sur l'Anémie vermineuse. [Note on Vermilion Anæmia. (Strongylidosis of Equines)].—*Ibid.* 200-201. [1 ref.]

Marotel deals with disease caused by the group of worms collectively known as the cylicostomes. On account of their mode of development and the greater numbers in which they occur, these worms are much more harmful than are the three larger species belonging to the genus *Strongylus*. The larvæ burrow into the mucous membrane of the large intestine where they remain for two months. When present in large numbers they seriously interfere with the normal functions of the intestinal wall. This is a predisposing cause of anaemia. They are also known to suck blood and when many are present the loss of blood must be quite important. A third way in which the anaemia is produced is most probably through toxic substances secreted by the worms.

When symptoms have appeared, the prognosis is unfavourable. Carbon tetrachloride and oil of chenopodium are useful for the expulsion of the adult forms, but no drug is yet known which acts upon the larvæ. It is recommended that infected animals should be segregated and treated and that damp pastures should be drained.

Gadiou reports three cases of verminous anaemia due to cylicostomes. After the diagnosis had been confirmed by coprological examination, anthelmintic treatment was carried out, but the disease had reached too advanced a stage; one animal died and the other two had to be destroyed. The author considers that the systematic examination of the faeces of young horses is advisable as this would enable anthelmintic treatment to be used in the early stages of the disease. For advanced cases, when cure is doubtful, it is the best policy to slaughter the animals and so to dispose of a dangerous source of infestation.

NIKOLSKY. (1931). Note sur la prophylaxie des métastrongylioses du mouton en U.S.S.R. [Prophylaxis against Metastrongylidosis of Sheep in U.S.S.R.].—*Bull. Off. internat. Epiz.* 5. 278-280.

The author outlines the organisation of the research institutes for the investigation of parasitic diseases of sheep in Russia. It is said that more than 30 remedies of repute, tested for the treatment of animals infested with *Dictyocaulus*, have been found to be of little or no value. A project is on foot to carry out mass treatment of affected animals by means of gas chambers. A mixture of iodine and glycerin in water has so far been found to be the best medicament for use in intratracheal injections.

HAMILTON, C. M. (1931). *Capillaria annulata* in Hungarian Partridges.—*J. Amer. Vet. Med. Ass.* 78. 865-866. [1 ref.]

Post-mortem examinations were carried out on four Hungarian partridges, all of which had died at about the same time.

One bird shewed typical lesions of entero-hepatitis. In the second, a canker lesion was found in the mouth. The third bird was in good condition; two *Capillaria annulata* were recovered from the mucosa of the crop, but the cause of death was not determined. The fourth bird was very emaciated; a necrotic area was found at the upper part of the crop, the tissue surrounding the lesion being thickened and almost closing the lumen of the oesophagus. Large numbers of *C. annulata* were found in the mucous membrane at the affected point and it is considered that the worms had caused the death of the partridge.

- I. DÉVÉ, F. (1931). Sur l'échinococcosis secondaire bronchogène du poumon. [On Secondary Echinococcosis of the Lung].—*C.R. Soc. Biol. Paris.* 107. 438-441. [2 refs.]
- II. DÉVÉ, F. (1931). L'infiltration échinococcique extra-osseuse diffuse dans l'échinococcosis

osseuse. [Diffuse Extraosseous Echinococcal Infiltration in Hydatid Disease of the Bone].—*Ibid.* 107. 755-756. [2 refs.]

III. Dévé, F. (1931). Échinococcosis du canal rachidien secondaire à une échinococcosis osseuse iliaque, sans participation vertébrale. Pénétration du processus parasitaire par les trous de conjugaison. [Echinococcosis of the Spinal Canal Secondary to Echinococcosis of the Ileum without Vertebral Complications. Penetration of the Parasitic Growth by the Intervertebral Foramina].—*Ibid.* 107. 756-758.

I. The author, who has previously given a description of secondary pulmonary echinococcosis, here gives an account of further experiments on rabbits. These animals were given intratracheal inoculation with hydatid sand of ovine origin and were killed for careful histological examination at intervals varying from 2 hours to 263 days afterwards.

It was observed that, following the inoculation, the scolices are passively carried to various parts of the lung. Thirty-two hours later some are still free in the bronchi, but others are in active migration and penetrating the membranes. At the sixth day, small necrotic foci may be found; they are surrounded by a sharply limited zone of reaction, in the centre of which the scolices may be seen just beginning to develop into the cystic form. At the second month, characteristic cysts have developed and secondary cysts may be found within the bronchi or in the adjacent lung parenchyma. At four and a half months, when further development has taken place, cysts may still be found in the lumen of the bronchi.

The dehiscence of certain cysts has been observed to take place through the development of circumscribed areas of necrosis which develop in the surrounding tissues, with the result that the cysts are thrown off into the bronchi. Self cure is therefore possible, but because of the large numbers usually present, it is unlikely that the cure is ever complete.

II. The infiltration of hydatid cysts into the soft tissues adjacent to infected foci in the bone consists of two distinct processes which are usually, however, both present at the same time. The first process consists of the passive penetration of minute particles of hydatid tissue through the mesh of the oedematous tissue of the host. The second process consists of active exogenous proliferation of the cysts in the intermuscular connective tissue.

Groups of cysts may occasionally be found where no connection with the primary focus can be demonstrated. This may be explained by the passive transportation of minute particles of hydatid tissue containing a germ capable of starting a new centre of growth.

In this way, the author has observed the appearance of a secondary growth in the spinal canal independently of any involvement of the bone. In the third of the papers under review, the author gives an account of the occurrence of this condition.

III. It is now generally accepted that primary echinococcosis of the spinal canal does not occur, but that it is always secondary, invasion taking place through the inter-vertebral foramina.

A case is described in which primary infection occurred in the ileum and at autopsy was found to involve the adjoining muscles. Careful examination showed that the cysts had grown from the muscles lying on the vertebral column through the intervertebral foramina separating the twelfth dorsal and first lumbar and the second and third lumbar vertebrae and that a nest of cysts had formed in the extradural space just below the eleventh dorsal vertebra. The marrow of this vertebra was softened, but adjoining vertebrae appeared to be quite uninjured.

HALL, M. C. (1931). Veterinary Parasitology in the United States and in Russia.—*J. Amer. Vet. Med. Ass.* 78. 767-776.

The Governments of Russia and the United States are paying more attention to veterinary parasitology than are those of other countries and a comparison is here drawn between the growth and present position of the subject in these two countries. The Zoological Division of the Bureau of Animal Industry at Washington now employs 36 professional workers and five sub-professional workers in Washington and at nine field stations. Seven other Bureaux and Divisions have some interest in animal parasites and the numerous State Agricultural Experiment Stations are carrying out work on the subject.

In Russia, the growth of parasitology has been rapid and spectacular. Within a decade, an organisation has been developed equal to that which the United States has taken 45 years to build

up. At the present time the work is apparently less perfectly organised in the United States than in Russia—there are fewer trained workers and there is a comparative lack of such statistical data as have been obtained in Russia. On the other hand the United States has begun several control and eradication campaigns such as do not yet appear to have been taken up in Russia.

SKRJABIN's proposal for the international control of parasites is considered to be premature ; it will not be practicable until approximately perfect therapeutic and prophylactic measures are available.

DISEASES, GENERAL.

SMYTHE, R. H. (1931). **Soil Variations in Relation to Disease.**—*Vet. Rec.* **11.** 753-756.

A paper on the subject followed by considerable discussion at the meeting at which it was presented.

The author discusses the influence of soil formation and habitat upon the occurrence of disease within his practice in Cornwall. He associates milk fever with old pastures, manure and close misty weather, but dissociates it from dietary deficiencies. Since 1929, he observed increase in incidence of the disease *pari passu* with rationing on bone meal and cod liver oil.

Although iodine is high in the soil, actinomycosis is prevalent in the sandy areas. Johne's disease is rare on these soils, a fact attributed to absence of drinking pools on the porous sand. The sandy soils, particularly on high cliff land, do not favour propagation of intestinal parasites. Impaction of the digestive organs with sand, however, is common (a painful in the reticulum) and newcomers to the district do not always realise the danger of grazing cattle in the sand storms blowing inland during gales.

The local use of tubs in the fields where water is scarce is regarded as increasing dissemination of tuberculosis. In the highly cultivated market garden areas (loam) he finds tetanus exceedingly common. The granite regions show a higher incidence of milk fever and, owing to the prevalence of old pasture and bracken cover for ticks, redwater is prevalent. In these granite soils drinking pools polluted with faeces abound and Johne's disease is common.

He also finds contagious abortion and sterility more prevalent in the granite areas and blames faulty hygiene, aggravated by dietary deficiencies. Where maize is utilised as staple cereal he observes higher incidence of functional sterility. He considers a recent increase in "pregnancy toxæmia" to be related to diet and to be reduced by change of feeding.

DŒVE, W. C. A. (1931). Diagnostiek in de Practijk van enkele besmettelijke Veeziekten. [Practical Diagnosis of some Contagious Animal Diseases].—*Ned.-Indisch. Blad. v. Diergeneesk.* **43.** 302-312.

This paper was given in the form of a lecture to veterinarians in the Dutch East Indies ; the author describes the present-day methods available for the diagnosis of anthrax, haemorrhagic septicæmia and surra.

Rossi, Paul. (1931). La maladie de la peur chez le chien. ["Fright Disease." Canine Hysteria].—*Rev. gén. Méd. vét.* **40.** 201-223. [45 refs.]

In this lengthy review, the author summarises papers by English, American and Dutch workers and includes results of his own researches. Unfortunately, owing to the low mortality (2·4 per cent.), he is only able to include data from one complete *post-mortem* examination and from the examination of two heads.

No new data are disclosed concerning the symptomatology, prophylaxis or treatment of the disease, but the paragraphs dealing with its causation are valuable. Endo- and ectoparasites, food-stuffs, bacteria, anaphylactic factors, and psychological influences are discussed at length ; but, although proprietary dog biscuits and gram-negative bacilli have been incriminated in certain cases of canine hysteria and have even been found to reproduce a comparable disease in other animals, the author is unable to point to one constant factor which may be considered the primary aetiological

agent. HANCOCK's pollen theory and the dispersal of the toxic agent by grain contaminated by infective pollen are outlined.

ARNDT, Hans-Joachim. (1931). Ueber die Amyloidose der Serumpferde. [Amyloidosis in Horses used for the Production of Serum].—*Arch. wiss. prakt. Tierhlk.* **63**. 1-11. 4 text figs. [18 refs.]

The majority of the horses examined had been used for the production of anti-diphtheria and anti-tetanus sera. Histological examination of 51 out of 90 horses revealed the presence of amyloidosis in the liver, spleen, adrenal glands, kidneys and intestines. Observable disease appeared on an average about eight months after the commencement of immunisation, but in certain cases it was already present within five months. Anti-tetanus immunisation appeared to produce the condition to a greater extent than anti-diphtheria immunisation.

The author suggests that, on account of the rôle played by the reticulo-endothelial system in the production of antibodies, degenerative changes in the liver and spleen could interfere with the production of potent anti-sera, but this view has not been tested under experimental conditions.

MEYER, J. R. (1931). Sur l'anatomie pathologique de deux maladies des Perroquets observées à São Paulo. [The Pathological Anatomy of Two Parrot Diseases seen at São Paulo].—*C. R. Soc. Biol. Paris.* **106**. 1015-1017. (3 refs.)

Two pathogenic agents have previously been described in connection with an epizootic of parrots in São Paulo, one a salmonella organism, the other a filter-passing virus. The author has carried out inoculation experiments on parrots and parakeets with both these agents and has found that, whilst both give rise to necrotic changes in the liver and spleen, the lesions are microscopically distinguishable. The virus is very fatal for the parrot, but the author considers that it is distinct from the psittacosis virus of KRUMWIED *et al.* because it did not appear to be infectious to man and also because the cell inclusions seen were intranuclear and not extranuclear. The salmonella organism was less pathogenic than the virus and the two had no immunological relationship.

FRASER, A. C. (1931). A Study of the Blood of Cattle and Sheep in Health and Disease.—*First Rep. Direct. Inst. Anim. Path. Cambridge.* 114-204. 46 tables. [73 refs.] Cambridge : W. Heffer & Sons, Ltd. [10s. net.]

This is a very detailed paper on the blood of normal cattle and sheep from an early age to adult life. The individual blood corpuscles encountered are fully described and numerous charts show their inter-relationships and variations during growth of the animal to maturity.

The author's average figures for normal blood cell counts for adult cattle are :—

Red blood corpuscles 6,779,000 ; white blood corpuscles 7,800 per c.mm. ; (lymphocytes 51 per cent., neutrophils 30 per cent.).

For adult sheep they are :—

Red blood corpuscles 10,000,000 ; white blood corpuscles 8,000 per c.mm. ; (lymphocytes over 50 per cent.).

During immaturity these numbers are greatly exceeded and wide variations occur at different times, in different individuals and in the sexes. Variations also occur according to diet and sexual activity.

The author considers that the Arneth count is valueless for the diagnosis of bovine tuberculosis, but that the Schilling haemogram method is useful. The blood counts of cattle affected with open tuberculosis, of reactors to the tuberculin test and of animals experimentally infected with tuberculosis, did not differ regularly from the normal nor among themselves. In 11 cattle suffering from piroplasmosis, anaemia (red blood corpuscles about 3,000,000 per c.mm.) did not develop until five days after the urine became discoloured. Reticulocytes did not appear until two days after this symptom was present.

Five cows infected with *Br. abortus* showed a definite lymphocytosis,

The blood counts of individual cattle affected with certain other diseases (mastitis, arthritis, etc.) are also given.

Sheep moderately infested with various species of *Strongyloidea* showed no characteristic deviation from the normal blood picture, but heavy infestation was associated with a low red cell count; the white cells were normal, but the percentages of the different white cells varied among the individuals.

Lambs affected with lamb dysentery showed a leucopenia, but no difference was found between the blood of ewes with affected lambs and that of control ewes.

RICHTER, Maurice N. (1931). Numerical and Morphological Changes in the Blood Cells, exclusive of Primary Blood Diseases.—*Folia hæmat.* 43. 518-535. [124 refs.]

The subject is considered under two main headings:—

(1) Changes in leucocytes—these deal with the Cooke, Schilling and Gibson counts, the monocyte-lymphocyte ratio in tuberculosis, the blood changes in cerebro-spinal meningitis, jaundice, cirrhosis, mononucleosis, hyperthyroidism, diabetic acidosis, epilepsy, eosinophilia, arsenic and benzol poisoning and in agranulocytosis.

(2) Changes in the erythrocytes—these deal with red cell variations in pregnancy, kidney diseases and various anaemias, notably anaemia of the newborn and that associated with the feeding of goats' milk.

A final brief note is added concerning the platelet count in typhus fever.

HALL, Byron E. (1931). A Critical Review of the Hæmatological Literature dealing with the Results of the Supravital Staining Method.—*Folia hæmat.* 43. 206-234. [125 refs.]

The author reviews the literature on supravital staining. It is impossible to make a useful abstract as his account is already condensed. He summarises the position with regard to the differentiation of blood cells by the use of different stains.

It is clear that the "rosette" of the monocyte and other cells is not a constant factor in that it varies with the activity of the cell. MAXIMOV concludes that it is merely the functional expression of a temporary state of a cell and that as such it is useless to attempt to differentiate the monocyte from the lymphocyte, etc. Other characters of the supravitally stained monocyte are also variable—mitochondrial arrangement, motility and the location of phagacytosed structures.

The author discusses the importance of certain blood cell observations in tuberculosis.

He is of the opinion that the usefulness of supravital staining is limited on account of its complicated nature and the amount of time required to carry it out, but there will be difference of opinion on this point.

BORCHARDT, H. (1931). Sammelreferat. Normale und pathologische Morphologie und Physiologie der weissen Blutzellen. [Collective Review on the Normal and Pathological Morphology and Physiology of the White Blood Cells].—*Folia hæmat.* 44. 98-124. [65 refs.]

A review of a wide range of work relating to the normal and pathological morphology and physiology of the leucocytes. Much of the paper concerns the problem of ferments in cell physiology and of embryological development and amoeboid movement.

GOTTRON, H., & JAFFÉ, K. (1931). Blutveränderungen bei Hautkrankheiten (Sammelreferat aus den Jahren, 1928/29). [Blood Changes in Skin Diseases. (Review for 1928/29)].—*Folia hæmat.* 44. 508-517. [51 classified refs.]

This review deals with the purpuras, polycythæmia and leucæmia in relation to skin diseases, lymphogranulomatosis and mycosis fungoides. It also deals with various changes of the blood in certain infectious diseases involving the skin (tuberculosis, etc.), and with blood groups in connection with such conditions.

FURTH, J., & STRUMIA, M. (1931). **Studies on transmissible lymphoid Leucemia of Mice.**—*J. Exp. Med.* 53. 715-731. 8 text figs. [8 refs.]

The authors have transmitted two spontaneously-occurring mouse strains of lymphoid leucæmia. Both lymphoid leucæmia and aleucæmic lymphadenosis were reproduced separately in mice inoculated intravenously with the same material and the authors consider the two conditions to be different forms of the same disease. They favour the view that leucæmia in mammals is a neoplastic disease.

GRAY, Henry. (1931). **Some of the Common Diseases of the Rabbit.**—*Vet. Rec.* 11. 921-926.

The author deals with coccidiosis, treponemiasis (venereal disease), internal and external parasites, tuberculosis and pseudo-tuberculosis, bacillary necrosis (Smorl's disease), "snuffles" and alimentary troubles resulting from improper feeding. He emphasises the fact that most of these complaints can be avoided if proper attention is paid to the principles of hygiene and feeding.

CUILLÉ, & DARRASPIN. (1931). Sur le diagnostic de la strongylose cardio-pulmonaire et de la tuberculose chez le chien. [**On the Diagnosis of Cardio-Pulmonary Strongylosis and Tuberculosis in the Dog.**].—*Rev. vét. et J. Méd. vét.* 83. 121-127. 2 plates. [1 ref.]

These two diseases are of relatively frequent occurrence in the South-West of France and are easily confused with each other. Cardiac insufficiency is a prominent symptom of infestation with *Hæmostrostrongylus vasorum* and is usually associated with pulmonary emphysema, bronchial catarrh and chronic pneumonia. The diagnosis is confirmed by the demonstration of larvæ in the pharyngeal mucus or in the faeces. This is easy when worms are numerous, but where they are few it may be necessary to make frequent examinations. Larvæ appear to be particularly difficult to find between the months of November and January and the authors think that the worms do not produce eggs during that period.

The symptomatology of tuberculosis is very similar. In the absence of worm larvæ, a search should be made for acid-fast bacilli in the pharyngeal mucus after coughing, and in the faeces. The tuberculin test should be used, but it must be remembered that infected animals occasionally fail to react. Evidence of tuberculosis may also be obtained from the observation of diffuse osteoperiostitis of the four extremities. Because of the focal reactions, the injection of tuberculin enables the osseous alterations to be observed at an earlier stage than would otherwise be possible and it makes the beginnings of the process perceptible with certainty by means of the X-ray.

QUATTROCOLO, Paolo. (1931). La poliartrite dei puledri ed il trattamento col siero polivalente. [**Polyarthritis of Foals and its Treatment with Polyvalent Serum.**].—*Nuovo Ercol.* 36. 239-242.

This is a purely clinical note describing two cases of joint-ill in foals which were treated with polyvalent serum. No information of a bacteriological nature is supplied.

BENNET, G., & BAUR, W. (1931). **A Systematic Study of the Degeneration of Articular Cartilage in Bovine Joints.**—*Amer. J. Path.* 7. 899-413. [10 refs.]

An earlier report of the authors deals with variations in the composition of the synovial fluid in the carpo-metacarpal and astragalo-tibial articulations of the same animal. The fluid from the former was more viscid, contained more cells per cubic millimetre and more protein than the fluid from the latter joint. The finding of areas of degeneration in the medial articular cartilage was considered to account for the difference.

This article is a further report and the study has been conducted very thoroughly in an effort to determine the ætiological factor or factors involved as well as their action on the articular cartilage. An extensive histological survey was made of developing bone and cartilage of bovine embryos and

of the lesions found in these structures in aged cattle. Lesions were only found in bovines over two years old and the authors consider that an important predisposing factor is a weakly supported section of the articulation due to defective development. The affected areas were always found in exact opposition on both articular surfaces of a bone.

The authors describe the changes in the structures involved and show that in some of the oldest lesions there was a slight attempt at repair. While they regard the inherent defect in the bone as the predisposing cause, they consider that injury is the exciting cause.

The most extensive lesions were found in aged bovines ; the authors never found the condition in horses and suggest that the carpo-metacarpal articulation in bovines is not as perfect as it is in equines.

Examination of the articulation for evidence of bacterial infection yielded negative results and the authors express the opinion that there was no evidence of any gout-like condition.

These lesions have no relationship to the articular rheumatism of cattle described by HUTYRA and MAREK.

CARPENTIER. (1931). Ostéo-périostite des os longs chez un Poulet. [Osteo-periostitis of the Long Bones of a Fowl].—*Rec. Méd. vét.* **107**. 465-466. 1 plate.

Great thickening of certain of the long bones was found in a three months old cockerel when presented cooked for the table although, when handled before cooking, it was considered to be normal. There was excessive deposition of bony tissue around a normal medullary canal in the region of the middle third of the shafts. The bones were hard and heavy. A normal average tibia weighs about 12 g. whereas an affected one weighed 39 g. The viscera were normal. Other members of the same flock were killed and were found to be normal. Cooking had destroyed all possibility of transmission experiments, but as there had been intermittent lameness (believed by the owner to be due to rheumatism), the author concludes that this bony hypertrophy must have been of tuberculous origin.

SARTORIS, Piero. (1931). Le sindatilie negli animali domestici. [Syndactylism in Domesticated Animals].—*Nuovo Ercol.* **36**. 169-178. 4 figs. [30 refs.]

The author reviews at some length the literature regarding syndactylism ; he describes a case which occurred in a seven months old calf. There was fusion of the digits in both fore legs, but the exact nature of the fusion was not quite the same in the two limbs. In the one it was limited to the second and third phalanges and, in the other, all three phalanges were united. The article is illustrated and X-ray photographs show the abnormalities very clearly.

DURIN, G., & UNGLAS, G. (1931). L'hématurie essentielle des Bovidés. Essais de traitement. [Bovine Hæmaturia. Attempts at Treatment].—*Rev. Path. comp.* **31**. 1025-1029. [8 refs.]

The authors consider that chronic bovine hæmaturia is a colibacillosis and that a cure may be effected by means of vaccination therapy ; they give the history of two cases treated with repeated doses of *B. coli* antivirus, but provide no evidence that the treatment produced any specific curative effect.

LEGORI, E. (1931). Contributi sperimentali alla cura della sterilità dei bovini. [Experimental Contribution to the Cure of Sterility in Bovines].—*Clin. Vet. Milano.* **54**. 47-53. 4 tables.

For sterility caused by disease of the uterus, the author recommends washing out with iodine, or iodine and glycerol. Massage of the ovaries is sometimes useful when these organs are cystic. He also recommends a commercially produced follicular extract.

HEELSBERGEN, T. van. (1931). Infectiöse Cloacitis bei Hühnern. [Infectious Cloacitis of Hens].

—Deuts. tierärztl. Wschr. 39. 274-275. 1 text fig. [3 refs.]

A paper dealing with the sporadic poultry disease "infectious cloacitis" originally termed "ulcerative cloacitis" when first recorded by GOLDBERG and BENSON [(1919). Rep. New York State Vet. Coll.].

The authors review the American literature and record their own experiments. Their main conclusion is that the disease is chiefly transmitted by cocks, which can themselves remain carriers for a long time. No transmission occurred by contact between diseased hens and healthy hens in the same pen, but when a healthy cock was introduced transmission occurred. A cock previously running with infected hens carried the disease on transfer to a pen of healthy hens. No transmission could be effected when cloacal exudate of infected hens was transferred mechanically by rubbing with a sponge. It is therefore probable that the cock is no mere mechanical transmitter, but is himself infected. *B. pullorum* could not be detected in affected mucous membranes and the etiology of the disease is regarded by the authors as still obscure.

DONHAM, C. R., & SIMMS, B. T. (1931). Fertility Studies in the Bull. I. Studies of the Genitalia of Bulls obtained from the Abattoir.—*J. Amer. Vet. Med. Ass.* 78. 658-664. [2 refs.]

DONHAM, C. R., SIMMS, B. T., & SHAW, J. N. (1931). Fertility Studies in the Bull. II. The Relation of the Microscopic Findings in Semen to its Fertility.—*J. Amer. Vet. Med. Ass.* 78. 665-679. 8 tables.

The genitalia of 201 bulls were obtained immediately after slaughter and were examined for general condition and for gross lesions; secretion and tissues from all parts of the system were also examined microscopically, mostly in fresh preparations.

Adhesions of different locations and degrees between testis, epididymis and scrotum were found in 75 per cent. of the bulls, but the lesions did not appear to have any significance in relation to fertility.

An account is given of each part of the genital tract. It was found that active spermatozoa were obtainable from all parts. The secretion of the seminal vesicles has an inhibitory effect on sperm motility. Detachment of the tails of spermatozoa was presumed to be due to mechanical influences and not to any spontaneous or pathological changes in the cells themselves.

The semen of bulls was obtained from the vaginas of cows immediately after service and fresh smears were examined microscopically. The motility of the spermatozoa was thus roughly assessed and the results were expressed as percentages of motile cells. Ninety per cent. and over was taken to mean normal motility and, on this basis, just under half of the 101 bulls examined were normal.

Out of 17 bulls whose breeding records were available, seven were considered to be normal and ten to be subnormal. In the normal group, five services out of nine were fruitful as against five out of fifteen in the subnormal group. The breeding records of these bulls for the entire season closely resembled those of the few detailed observations noted above. In the case of the bulls of the normal group, 2.1 services were required per pregnancy as against 2.94 in those of the subnormal group.

Similar tests were carried out on a further lot of bulls belonging to experimental farms. The semen of 14 bulls was examined repeatedly and the breeding results were compared. It was concluded that there was no significance between frequency of service, seminal picture and fertility as shown by subsequent conceptions. In many cases pregnancy followed services with spermatozoa of low motility and in other cases conception did not follow after service in which highly motile sperms were present. [The relation of the females to these inconsistent results is not discussed].

The authors conclude that the breeding capacity of a bull cannot be correctly assessed by a single examination of semen as the spermatozoa of an individual vary considerably from time to time and not directly according to the number and frequency of the services.

CHAMBERS, F. (1931). The Incidence of Cancer in the Domestic Animals.—*Vet. Rec.* 11. 709-712.

The author gives a brief review of certain English publications on cancer in animals, referring

to the commoner theories of cancer formation. He also describes cases which he has seen during the last 10 years ; the majority of these cases occurred in dogs.

NIIMI, D. (1931). **Patho-Histological Studies on the characteristic Haemangioma in the Serotum of Swine.**—*J. Jap. Soc. Vet. Sci.* 10. 31-52. 2 plates. [18 refs.]
[In Japanese ; from English Summary].

The author states that these tumours are extremely common in the scrotal skin of old Yorkshire boars and, to a lesser extent, in Berkshire boars in the vicinity of Tokyo. The tumours are small, multiple and wart-like and are sometimes seen also in the skin of the mammary glands of old sows.

The tumours could be divided into four separate types :—carcinomatous, sarcomatous, simple and cavernous haemangioma, the first named being the commonest. The pathogenesis of the condition is discussed.

MAKOWER. (1931). Les tumeurs spontanées chez les oiseaux. [**Spontaneous Tumours of Birds**].—*Rev. Path. comp.* 31. 703-719, 825-854.

The material examined by the author comprised 62 tumours, the majority of which were obtained from the Paris slaughterhouses. Her object was to determine, as far as possible, the general characters of spontaneous tumours occurring in birds and to compare them with the tumours encountered in mammals.

A brief historical survey is given of the work done in various parts of the world regarding the occurrence and transmission of avian tumours and this is elaborated in subsequent sections of the paper.

The first section deals with the relative incidence of tumours, figures from the work of various authors being quoted.

The second section deals with the classification and the characters of the tumours. These do not appear to be original observations as the whole of the material is taken from previous papers. The types of tumours, recorded as having occurred in the various organs and tissues of the body, are described in some detail and a list showing the incidence of certain tumours is given.

Out of the 62 cases examined by the author, eight were inflammatory granulomas of various kinds and were not tumours at all. Twenty-seven of the cases represented lymphoid or myeloid hyperplasias ; there were three lipomata, four fibrosarcomata, five fusiform sarcomata, two myxosarcomata, two myomata, one angioma, one fibro-lipo-sarcoma and four epitheliomata of the ovary.

DISEASES RELATED TO NUTRITIONAL AND METABOLIC FACTORS.

RANGANTHAN, S. (1931). **Researches on "Stone." Part IX. Studies on Calcium and Phosphorus Metabolism.**—*Ind. J. Med. Res.* 19. 1-47. 15 tables, 6 charts. [13 refs.].

RANGANTHAN, S. (1931). **Researches on "Stone." Part X. Cattle Stone.**—*Ibid.* 49-50. 1 table.

MCCARRISON, R. (1931). **Researches on "Stone." Part XI. On the Effect of Milk in Preventing the Formation of Calcium Stones in the Urinary Tract of Albino Rats.**—*Ibid.* 51-53. [1 ref.].

MCCARRISON, R., & RANGANTHAN, S. (1931). **Researches on "Stone." Part XII. On the relative Importance of Vitamin A, Radiostoleum, Cod-Liver Oil, and Sodium Phosphate in Preventing the Formation of Calcium Stones in the Urinary Tract of Albino Rats.**—*Ibid.* 55-60. 1 table. [6 refs.].

This series of four papers from the Nutritional Research Laboratories, Coonoor, continues the previous work (1927-1930) from the same source. It was previously shown that the urinary stones produced experimentally in albino rats were of two main varieties : one, a well defined crystalline stone consisting chiefly of ammonium magnesium phosphate but containing no calcium ; the other, a heterogeneous mass chiefly calcium carbonate. Both were characterised by complete

absence of uric acid, and the experimental diets which gave rise to them had deficiency of fat-soluble vitamins as common factor.

Paper IX continues the study of the effect of mineral balance upon the production of urinary calculi and traces the course of ingested lime through the body. The author shows that if the diet be perfectly balanced with respect to mineral constituents, calcium carbonate stones are not likely to occur even though there is deficiency of fat-soluble vitamins. He also shows that comparatively little fat-soluble vitamin is needed to maintain good growth on diets well balanced with respect to minerals. He discusses the paths of elimination of calcium, magnesium and phosphorus, the influence of varying proportions of these elements upon excretion *via* the gut and *via* the kidneys, and the value of the ratio "CaO retained/P₂O₅ retained" as a criterion of the biological efficiency of a diet.

Part X deals with the composition of a urinary calculus from a six-months-old calf which differed from the general average of 23 cattle stones by showing no carbonate, low calcium content, but high magnesium, phosphorus, nitrogen, and moisture. It also differed in being larger—about the size of a pea, as against "No. 4 lead shot size" of cattle stones.

Part XI records the effect of whole milk in preventing the development of calcium carbonate stones in albino rats. The addition of milk in sufficient quantity to a diet of white bread, yeast and lime, completely prevented the formation of such calculi.

Part XII shows that neither sodium phosphate alone, nor vitamin A alone, nor radiostoleum [a preparation containing both vitamin A and vitamin D issued by "British Drug Houses"] alone, wholly prevented the deposition of calcium carbonate stones in the urinary tract of albino rats fed upon the basal calculus-producing diet plus lime. The addition of both phosphate and vitamin A, however, afforded complete protection. The protective action of radiostoleum (when added with phosphate) was not so great as that of either cod-liver oil or vitamin A concentrate.

Two factors are regarded as essential in the production of calcium carbonate stones in rats; the first and most important is a deficiency of phosphorus relatively to calcium in the diet; the second is an insufficiency of vitamin A. A balanced adjustment of Ca and P, however, does not prevent stone unless the diet contains a sufficiency of vitamin A.

On the evidence of similarity of composition between the experimentally produced calculi of the white rat and the naturally occurring calculi of Indian cattle, the author deduces similarity of causation and predicts that a sufficiency of green fodder (to provide vitamin A) as part of a ration balanced with respect to Ca and P, will prevent the occurrence of calcium carbonate stones in cattle.

INNES, J. R. M. (1931). **The Pathology of Hypovitaminosis and Hypervitaminosis D and its Application to an Explanation of the Mode of Action of the Vitamin.**—*Proc. R. Soc. Med.* 24. 1368-1369.

INNES, J. R. M. (1931). **The Pathology of Hypervitaminosis D.**—*First Rep. Direct. Inst. Anim. Path. Cambridge.* pp. 93-107. 7 figs. 1 table. [21 refs.]

The author defines hypovitaminosis D (rickets) as a disturbance in endochondral ossification characterised by defective calcification and exaggerated cartilaginous proliferation, the matrix formed by the osteoblast remaining as uncalcified osteoid tissue. Bone already formed becomes resorbed with a resultant softening and distortion. The blood phosphate is always low and the blood calcium is frequently low, due apparently to diminished absorption from the intestine.

Hypervitaminosis is characterised by changes due to the same process reversed, i.e. excessive calcification, which includes blood vessels and body organs as well as bones.

The second paper describes experiments on rats and rabbits which were fed on diets containing an excess of vitamin D. The author states that the resultant disease has quite specific characters and that the *post-mortem* appearances are peculiar to the condition. Animals which are given excess vitamin D lose weight rapidly and die within a short time. At autopsy they are emaciated, the spleen is greatly atrophied and the kidneys have a mottled appearance due to the presence of white pin point areas; in a few cases, calculi are found in kidney and bladder. The stomach and intestine show glistening white patches in the muscular coat; the large arteries show white transverse streaks; the genital organs are undeveloped; the thymus, normally very prominent in the anterior thorax,

is absent and is only represented by blood stained connective tissue. The heart shows white areas in the musculature, particularly in the neighbourhood of the larger arterial branches. All the white streaks referred to consist of calcium deposits.

The characteristic changes in the bones are :—an increased formation and calcification of the *substantia spongiosa* at the epiphyseal ends of long bones, together with a decrease in the intermediate cartilage. The teeth show hyperplasia of cement and secondary dentine formation. The results of the feeding of various diets are given in detail and photo-micrographs of affected tissues show the characteristic lesions.

Control experiments were included with diets in which vitamin D was absent. Ergosterol either non-irradiated or over-irradiated had no harmful effects on the test animals.

It is emphasised that the typical changes in the walls of arteries are not those of arteriosclerosis ; there is no lesion of the intimia, no preliminary necrotic change, no cellular infiltrations nor any other sign of inflammation.

HARRIS and INNES [(1931). *Biochem. J.* 25. 367.] are of the opinion that an excess of vitamin D can both favour the absorption of calcium from the alimentary canal and, when absent from the diet, cause its withdrawal from bone.

THEILER, A. (1931). The Pathological Aspect of Mineral Deficiency in Cattle.—*Sect. Trans. Brit. Assoc. Adv. Sc. London.* 157-158.

A paper given as vice-president of Section M of the Association and dealing with the pathological examination of animals in the dietetic experiments recorded in 1927 [THEILER, A., GREEN, H. H., & DU TOIT, P. J. Minimum Mineral Requirements of Cattle.—*J. Agric. Sci.* 8].

In the earlier work an experimental aphosphorosis was produced in young heifers by stall-feeding on phosphorus deficient rations, and identified with the naturally occurring "stysiekte" [stiff-sickness] prevalent over the phosphorus deficient pastures in the Union of South Africa. In the present paper the osseous lesions produced are compared with those found in rickets and osteomalacia of man and animals. The disease "stysiekte" is definitely identified with true rickets in the adolescent and osteomalacia in the adult. The typical lesions were osteoporosis accompanied by a super-abundance of osteoid. The atrophy in the bones of young heifers was more pronounced than in the case of human rickets and osteoporosis is regarded as a primary change in the bovine disease.

The fact that osteomalacia was so readily produced by an insufficiency of phosphorus in the food, while calcium deficiency produced only a slight osteoporosis, leads the author to emphasise the significance of phosphorus deficiency and to minimise the significance of calcium deficiency in the etiology of the naturally occurring disease. The theoretical possibility that calcium could become the limiting factor in deposition of calcium phosphate in bone is conceded, but in pasture cattle the diseases rickets and osteomalacia are regarded as due exclusively to phosphorus deficiency.

The important part played by vitamin deficiency in the causation of human rickets and of experimental rickets in the rat, need not enter into the chain of causation of the same disease in cattle. The rations used in the experiments were deficient in all vitamins, when judged by conventional standards, but the strong sunlight to which the heifers were exposed apparently corrected the lack of vitamin D (activated ergosterol), while earlier rice-feeding experiments [THEILER, A., GREEN, H. H., & VILJOEN, P. R. (1915). *Third Report of the Director of Veterinary Research, Union of South Africa*] had demonstrated that exogenous supplies of the other vitamins were unnecessary for cattle.

Under the term aphosphorosis the author places a definite syndrome typical of dietary deficiency of phosphorus in cattle ; osteophagia, osteoporosis, osteomalacia, with rickets if the epiphyseal lines of the adolescent animal have not yet closed.

SJOLLEMA, B., & SEEKLES, L. (1931). Borna-ziekte bij het Paard en Grastetanie bij het Rund. [Borna Disease in the Horse and Grass Tetany in the Ox].—*Tijdschr. Diergeneesk.* 58. 809-812. [5 refs.]

In consequence of the great similarity between the symptomatology of Borna disease in the

horse and grass tetany of the ox, the authors, while considering that the latter disease may also be of an infective nature, examined the blood of a horse suffering from Borna disease and compared it with that taken from a cow suffering from grass tetany. In grass tetany, the mineral constituents of the blood are usually markedly abnormal, but in the sample of horse blood examined, the mineral constituents were normal.

The fact that grass tetany is curable by intravenous calcium therapy also helps to prove that specific infection has no place in its etiology.

—. (1931). Merkblatt über die Graskrankheit (Weidetod). [Note on Grass Tetany in Milk Cows].—*Berlin. tierärztl. Wschr.* **47**. 625-626.

This is a general informative note issued by the "Landesgesundheitsamt" of Saxony. The disease only attacks milch cows when they are first turned out to grass in the spring. It is associated with a disturbance in mineral metabolism (decrease in blood calcium and magnesium). [See also GÖTZE, this *Bulletin*. **1**. 166].

GREAT BRITAIN. (1931). Mineral Content of Pastures.—*Sixth Rep., Economic Advisory Council*. 66 pp. London : H.M. Stat. Off. [8vo.] [1s.]

ORR, J. B., & HOLM, A. (1931). The Influence on Animal Health of Minerals in Diet.—*Ibid.* pp. 12-66. Appendix. 5 tables. Numerous text tables. [11 refs.]

This report represents part of a comprehensive scheme inaugurated in 1925 by the Committee of Civil Research, a body absorbed into the Economic Advisory Council in 1930. The publication is officially issued by a committee of this latter body, but the main scientific material appears in the Annexe under the authorship of J. B. Orr of the Rowett Institute, Aberdeen, and A. Holm, Director of Agriculture, Kenya. The experimental work was largely conducted by the staffs of the authors. Assistance of temporary workers, local officials, and settlers is acknowledged in the text (p. 38).

The investigational programme is comprehensive in most respects and a further report is adumbrated (p. 11), but the present provisional communication is of such significance that a somewhat lengthy abstract is justified.

The general results, to the close of 1929, may be summarised as follows :—

(a) Analyses of the pastures of Kenya colony gave evidence of variable but widespread mineral deficiencies. In four districts (Naivasha, Athi Plains, Nakuru, Molo) sodium and to a less extent chlorine, were unduly low when comparison was made upon the basis of cultivated British pastures. In Naivasha the pasture was otherwise rich, but in Molo the deficiency of phosphorus (0·11-0·27 per cent. P₂O₅ on the dry matter of the grass) was as acute as it is in some of the areas in South Africa [cp. THEILER, GREEN, and DU TOIT, *Jl. Dept. Agric., Union S.A.*, May, 1924] in which "lamsiekte" and "stysiekte" occur ["stysiekte" now identified by THEILER, on histological grounds, as identical with osteomalacia in the adult and rickets in the adolescent, cp. *Brit. Ass. Centenary Meeting*, Sept., 1931, *J. Sect. Trans.* p. 157].

The pastures of the two other areas were characterised by general deficiency of minerals and by low protein (Table I, p. 16).

(b) Although in the Nakuru district the phosphorus was sometimes low (range 0·047-0·626 P₂O₅ in the dry matter) the most significant deficiency appeared to be that of "available iron." This is held responsible for a disease passing muster under the name "Nakuruitis" [a local etymological atrocity for which the authors might well have substituted a more appropriate scientific term]. This disease occurs over a small area of about 30 square miles in the Nakuru district; an area characterised by a top soil erupted from the adjoining extinct Menegai volcano. The area is geologically reminiscent of the Rotorua district of New Zealand [a district characterised by pumice soil rich in manganese but with iron present as insoluble silicate not readily absorbed by the plant; cp. REAKES, C. J., and ALSTON, B. C., *N.Z. J. Agric.*, 1912, and ASTON, B. C., *ibid*, 1924, **28**, 215-238, 301-308, 381-390; also *Trans. N.Z. Inst.*, 1928, **59**, pt. 2. 406] upon which the disease "Bush-Sickness" occurs in cattle [cp. ORR, J. B. (1929) *Minerals in Pastures*. Publ. Lewis, London; Chapter 7, Deficiency Diseases in Australasia. Cp. also "Pining" and "Vinquish" of Scotland, *ibid* 70].

The disease of the Nakuru district is characterised by general cachexia and anaemia [low haemoglobin but ratio of Hb. to R.B.C. not recorded], and can be prevented and cured before the pre-mortem stage by the administration of iron (p. 45 *et seq.*). The various pathological findings at *post-mortem* included anaemia, oedema, enlargement of lymphatic glands, cirrhosis and degeneration of the liver, cirrhosis of the spleen and pigmentation of its pulp, chronic interstitial nephritis, enlarged heart with degenerated muscle, and gelatinous infiltration of the nerve sheaths. Two moribund affected animals were sent to the Veterinary laboratory, Kabete and examined by the research staff of the veterinary department. The disease is regarded as a specific anaemia with a specific cause and, according to the authors, has three well marked stages which may be epitomised as :—(a) unthrifty appearance for some months in spite of plentiful grazing; (b) progressive emaciation culminating after a few months in (c) sudden listlessness, unsteady laboured gait, *decubitus*, and *exitus* in about three days. Pica was not observed [neither osteophagia nor allotriophagia] although a marked predilection was shown for licks containing iron (group 4 mixture, iron oxide and sodium chloride). Even in the earliest stages, before clinical symptoms could be regarded as definite, animals on the deficient pasture seemed more liable to minor intercurrent illness (p. 47) than those receiving abundant supplementary iron (group 4 lick).

(c) In those districts in which the pastures were deficient in phosphorus and calcium, good results followed administration of minerals (group 2) and of minerals and protein (group 3). Production increases amounted to about 30 per cent. in the yield of dairy cows, 10 per cent. in rate of growth of lambs, and about 10 per cent. in weight of fleeces of sheep.

(d) Application of fertilisers to the deficient pastures was followed by marked increase in the yield of grass. This varied from 25 per cent. where common salt alone was used to remedy the deficiency of sodium and chlorine up to 400 per cent. where phosphates and nitrogen were used. The specific deficiency in phosphorus of some plots in the Molo area was reflected by an increase from 0.52 tons to 1.94 tons after fertilising with mineral phosphate (10 cwt. per acre); an increase of over three-fold. Cattle, when allowed free access to the experimental plots, unhesitatingly grazed the fertilised areas bare before touching the unfertilised pasture; a behaviour indicative of a natural discrimination for grass containing adequate minerals.

The results indicated in the report are of obvious economic significance and if confirmed in practical application by settlers should prove of great economic importance to the colony as a whole.

IMMUNITY.

EBERSON, Frederick, & SWEENEY, Marion A. (1931). **Tuberculo-toxins and their Significance in Allergy and Neutralisation Phenomena.**—*J. Immunol.* 20. 395-416. 8 tables. [30 refs.]

The authors state that their aim was to study the factors that might play a part in humoral allergy in tuberculosis, paying particular attention to the toxic substances obtained from cultures of the tubercle bacillus. They determined to re-investigate toxic filtrates with regard to the following points:—(a) the nature of the substances as possible antigens or allergens; (b) the production of specific antiserum for these tuberculo-toxins; and (c) comparative studies with ordinary tuberculin (Human O.T.) and filtrates prepared from focal tuberculous tissues in experimental animals.

The effect on tuberculous and normal guinea pigs of the intracutaneous and intraperitoneal injection of filtrates from cultures of tubercle bacilli was studied and comparisons were instituted with filtrates prepared from extracts of tuberculous lesions.

The toxic filtrates were prepared from cultures of a virulent strain of human tubercle bacilli grown on hormone broth (pH 7.4) for 5 to 18 days at 38° C.

Immune goat serum was prepared by the repeated subcutaneous injection of increasing doses of filtrate (Berkefeld) from cultures of the same organism.

Extracts from tuberculous lesions were prepared from guinea pigs inoculated intracutaneously with the same strain. After being minced and ground in salt solution, the extracts were filtered through a Berkefeld filter.

From the results obtained in these experiments, the authors were able to confirm their previously expressed view that toxic substances are produced by tubercle bacilli in suitable culture media.

Toxic filtrates, injected intracutaneously into tuberculous guinea pigs, produced very marked local reactions which could be modified by combining immune goat serum with the filtrate. No reactions were given by normal guinea pigs. Intraperitoneal injections of filtrate caused severe symptoms—dyspnoea, weakness and convulsions—often followed by death. No such reactions were obtained with guinea pigs which were not infected with tuberculosis.

Heating the filtrate to 100° C. for one or two hours modified or prevented the symptoms. Old tuberculin did not produce these reactions.

The filtrates prepared from local tuberculous lesions appeared to be quite inactive. The reason for this requires investigation.

GORDON, J. (1931). **The Action of Congo Red on Streptococcal Hæmolysin and on *B. welchii* Hæmolysin.**—*J. Path. Bact.* 34. 489-445. 2 tables. [7 refs.]

Using both filtered and unfiltered cultures of *Streptococcus haemolyticus* and unfiltered cultures of *B. welchii*, the author found that by adding Congo red in distilled water the hæmolysin was neutralised, the action being stronger in filtered streptococcal cultures.

The reversibility of this reaction was tested and it was found that ox serum acted as an adsorbant for Congo red, but only in tubes in which there was just enough Congo red to neutralise the hæmolysin. Excess of Congo red was not completely adsorbed.

In addition, cuprammonium artificial silk adsorbed Congo red combined with the streptococcal hæmolysin, but it did not absorb Congo red combined with the *B. welchii* hæmolysin, as the latter is destroyed by artificial silk.

Congo red, added to the non-bacterial hæmolysins, saponin, sodium taurocholate and sodium ricinoleate, had no effect on their hæmolytic action.

KHADER KHAN, H. (1931). **An Experiment in the Field. [Multispecific Simultaneous Inoculations].**—*Ind. Vet. J.* 8. 51-52.

A brief note concerning cattle which were inoculated on the same day with rinderpest serum and virus, with blackquarter aggressin and with haemorrhagic septicæmia vaccine. No ill effects followed in 21 animals so treated, but the author does not describe the results obtained.

PHYSIOLOGY.

CARREL, Alexis. (1931). **The New Cytology.**—*Stud. Rockefeller Inst. Med. Res.* 78. 331-345.

The study of cytology was for many years almost limited to the examination of the forms of cells, so far as this was possible in fixed preparations. There was little knowledge of cellular physiology until the method of tissue culture was developed. This led to the discovery of hitherto unknown important properties of tissues and to knowledge of cell sociology; it has also shown the need for study of cell environment.

In work on this subject, pure culture strains of main cell types are essential; the author outlines the technique utilised in modern tissue culture work and emphasises the importance of the cinematograph for observations on movement and on the general activity of tissues.

In order to obtain "pure" (single cell type) cultures, cells may be mechanically isolated or the tissue may be treated with selective poisons or nurtured on special diets which allow only one type of cell to multiply.

Species of cells so far isolated are:—tissue macrophages, fibroblasts, cartilage cells, iris epithelium, blood and thyroid tissue and malignant cells—chiefly sarcoma cells, carcinoma cells and spontaneous cancer cells of the mouse. Most of the cells are capable of living indefinitely *in vitro* in suitable conditions just like bacteria.

Special solid, liquid and gaseous nutritive media are used and, between each replacement of foodstuffs, the tissues are washed in Tyrode's solution.

After 19 years, a strain of fibroblasts has remained unchanged; time has, therefore, no effect on a culture if the medium is changed constantly; "age" is due to chemical changes in the

surrounding medium. Strains of morphologically identical fibroblasts may be differentiated by their nutritive requirements ; each cell type, therefore, requires a special diet. Changes in the nutritive media may, for example, turn fibroblasts into macrophages and these may in turn change into monocytes.

Tissue culture work has shown that malignant cells are variants of normal cells, but that they never revert to their original type after years of cultivation. This new cytology has presented a means of studying normal and malignant cells from the physiological and structural standpoints.

SCHWARTE, L. H., & DUKES, H. H. (1931). **The Action of Drugs on the Cardiovascular Mechanism of the Pig.**—*J. Amer. Vet. Med. Ass.* **79.** 180-194. 10 figs. 2 tables. [6 refs.]

This is the continuation of a previous paper by the same authors [see this *Bulletin*. **1.** 246]. In these experiments, a local or general anaesthetic was used as required, but it was first ascertained that the former did not materially affect the normal blood pressure. With regard to the influence of general anaesthetics, it was found that ether caused a fall in blood pressure from the normal figure of 169 mm. Hg to an average of 121 mm. Hg ; chloroform caused a greater fall, i.e. to 111 mm. Hg. Urethane injected intraperitoneally caused a great fall to about 63 mm. Hg. It is interesting to note that urethane does not cause such a heavy fall in dogs and cats ; in these animals it has only a slight depressant effect ; 15 g. of urethane caused the death of a 68 lb. pig when injected intravenously. One c.c. of ethyl alcohol (95 per cent.) given intravenously in 4 c.c. of saline solution caused a transient rise in blood pressure, whilst 2 c.c. caused a marked fall.

Arecoline hydrobromide in doses of 1-5 mg. caused a fall in blood pressure ; atropin (1-3 mg.) caused a rise, but there was great irregularity in its extent. Nitroglycerine (0.65-2.0 mg.) caused a marked fall, pilocarpine (1-5 mg.) a fall and strychnine (2-4 mg.) a definite rise in blood pressure.

DUKES, H. H., & SCHWARTE, L. H. (1931). **On the Nervous Regulation of Respiration in the Pig.**—*J. Amer. Vet. Med. Ass.* **79.** 195-198. 3 tables. [2 refs.]

This work, which the authors believe to be the first to appear in veterinary literature on this particular subject, is devoted to the results produced on respiration by section or stimulation of the nerves controlling it. Tight ligation of the vagus nerve gave such inconstant results that no conclusions could be drawn. Stimulation of the central end of the vagus after section had, as a rule, an inhibitory effect on respiration, especially where the left nerve was concerned.

Stimulation of the central end of the sciatic nerve gave variable results. Ligation of both carotid arteries had no effect on respiration.

MAIGNON, F., & GUILHON, J. (1931). Influence de la castration sur les variations saisonnières des combustions respiratoires chez le chien. [**The Influence of Castration on the Seasonal Variations in Respiratory Metabolism in the Dog.**]—*C.R. Soc. Biol. Paris.* **107.** 591-594.

Glycogen formation presents seasonal variations due to alterations in the activity of the sexual organs.

In the dog, muscular glycogen is highest in spring and autumn and lowest in summer and winter ; it is higher in the male than in the female. Castration in the female guinea pig lowers the muscle glycogen, whereas testicular extracts injected into non-castrated subjects have an opposite effect. Since oxygen consumption is greatest in spring and least in winter and the variations [as in the case of glycogen formation] are independent of temperature conditions, the authors correlated these two factors and confirmed their hypothesis by experiments on young dogs.

Castration lowers the oxygen consumption and, consequently, the respiratory quotient ; the effect is more marked if the operation is carried out in spring when the gonads are active in relation to respiratory metabolism. Pituitary hypertrophy appears to compensate for the loss of the gonads.

I. KINDRED, J. E. (1931). **Abstract of Studies on the Histology of Blood Cells and Hæmopoietic**

Tissues which have appeared in the Journals of the United States from September, 1929, to September, 1930.—*Folia haemat.* 43. 536-550. [90 refs.]

II. KEY, A. J. (1931). Review of American Literature on Erythrocytes for 1929.—*Ibid.* 43. 247-257. [30 refs.]

I. The author gives brief summaries of 90 papers, grouping them suitably under the following topics :—age of the corpuscle ; blood counts ; cytoplasm ; ductless glands ; experimental lesions ; haemoglobin ; haemophilia ; haemopoiesis ; infection ; injection of chemicals ; jaundice ; leucæmia ; lymphatic organs ; metabolism ; macrophages ; monocytes ; physical agents ; reviews ; technique ; transplants and tuberculosis.

These aspects of the question are considered in relation to human beings, calves, dogs, cats, chickens (hens), rabbits, rats, mice, guinea pigs, frogs, and also amphibia and fish.

II. In this paper, the author gives brief summaries of 30 articles which deal with various aspects of the study of red cells, particularly with development, immaturity, segregation apparatus, trypanosomes, haemolysis, haemoglobin, red cells of the new born, fragility and sedimentation, sickle cells and the measurement of erythrocytes.

In one section of the paper, the author refers to an article by ZEIDBERG [(1929). *Amer. J. Physiol.* 90. 172.] dealing with the haemoglobin content of rabbit fœtuses.

WILHELM, Charles, & MANN, Frank. (1931). Researches on the Physiology of the Blood : A Review of Data published in America during 1929.—*Folia haemat.* 43. 235-246. [78 refs.]

This review deals particularly with literature on blood as a tissue and omits that on the mechanics of the circulation and on pernicious anaemia. As this is a review and essentially an abstract itself, it is only useful here to enumerate the precise subjects dealt with. These include :—blood regeneration in experimental anaemia ; vitamin deficiencies ; blood clotting ; sedimentation rate of erythrocytes ; acid-base equilibrium of blood and other tissues ; plasma proteins ; blood sugar ; pregnancy ; influence of insulin on urea and amino acid content of blood ; standardisation of normal blood calcium values ; and metabolism of blood cells.

DEANESLY, Ruth. (1931). The Effects of oestrin of the Pseudo-pregnant Mouse.—*J. Physiol.* 72. 62-73. 4 tables. [17 refs.]

In the mouse, sterile copulation prolongs diœstrus by about five days. It is known that, following this pseudo-pregnancy, the *corpora lutea* become functional and the author has investigated their reaction to oestrin.

Albino mice were used and oestrus was determined by the vaginal smear method ; an aqueous solution of oestrin (Marrian's preparation, 1929) was injected in four equal doses at 12-hour intervals.

It was found that 3-10 mouse units of oestrin, injected during the first half of pseudo-pregnancy, produced cornification of the vagina and that copulation followed in about a half of the animals utilised. The same proportion of mice examined after death showed marked degenerative changes in the *corpora lutea* of pseudo-pregnancy, i.e. the accumulation of osmicated fat, often associated with shrinkage and vascular collapse.

A fresh ovulation leading to the formation of normal *corpora lutea* occurred in a number of mice at the time of the experimental *oestrus*. The results as a whole showed considerable variation.

BORCHARDT, H. (1931). Sammelreferat. Morphologie und Funktion des Retikulo-Endothels und des Bindegewebes. [Collective Review on the Morphology and Function of the Reticulo-Endothelium and Connective Tissue].—*Folia haemat.* 44. 410-426. [37 refs.]

The author attempts to reconcile the numerous theories that have been put forward on this subject. He refers to the work of HESSE [(1928). *Zeitschr. f. d. ges. exp. Med.* 59.] who has contributed much by his work on slow ("chronisch") vital staining and to the work of WALLBACH [(1928) *Zeitschr. f. d. ges. exp. Med.* 60.] on cellular activity in relation to vital staining.

He also discusses :—the storage of dyes in granulation tissue, the influence of the endocrine system on the storage function of the reticulo-endothelium and the function of the latter in many physiological conditions in relation to chemotherapy and to a number of diseases.

WATSON, Chalmers. (1931). **Radiation in relation to Human and Animal Nutrition with a Theory as to the Nature of Vitamins.**—*Proc. R. Soc. Med.* **24.** 1413-1424. 2 charts. 5 figs.

This article relates to the possible biophysical rather than to the biochemical origin of vitamins.

The author quotes some experiments of his own (1906) in which excess meat produced retarded growth, sterility, diminished lactation and loss of resistance to disease in rats. His recent work has shown that irradiated skim milk (0.15 per cent. fat) in the diet cures rickets. LEVICK, in the discussion which followed this paper, records work showing that ultra-violet ray treatment of rickets gives successful results when cod liver oil has failed.

The Gerson, highly-vitaminised diet is discussed and a favourable report of it is given.

Watson believes that sunlight provides vital energy in living plants for the formation of vitamins, hence the necessity for "fresh" foods.

He quotes POPP's experiments on plant physiology in which the blue-violet area of the spectrum was eliminated ; plants grown under this condition develop very poorly and are in a state analogous to an avitaminotic condition in animals.

SUSSDORF, von. (1931). Das Netz in seinem Verhältnis zum Bauchfell und zu den Baucheingeweiden bei den Haussäugetieren. [The Omentum and its Relationship with the Peritoneum and Viscera in the Domestic Animals].—*Arch. wiss. prakt. Tierhlk.* **63.** 189-200. 6 figs.

This is a general anatomical review of the arrangement of the abdominal viscera, particularly with regard to the position of the great omentum in horses, ruminants, dogs and pigs. There is no new information concerning the function of the omentum.

BUGGE, G. (1931). Zum Vorkommen von Fettgewebe in den Lungensepten des Schweines und der übrigen Schlachttiers. [The Occurrence of Fatty Tissue in the Pulmonary Septa of Pigs and of other Food Animals].—*Berl. tierärztl. Wschr.* **47.** 244-247. 4 figs.

In a considerable number of healthy fat pigs, sheep and cattle, clumps of fatty tissue cells were found in the subserous connective tissue of the pulmonary pleura and also on the surface and in the depth of interlobular septa ; they occurred both in young and in adult animals. The author considers that these fatty inclusions were the result of intensive feeding prior to slaughter and that they were not pathological.

SPECIFIC DRUG THERAPY.

NIESCHULZ, O. (1931). Over behandeling van Paarden-Surra met Naganol en "Höchst 4002." [On the Treatment of Equine Surra with Naganol and "Höchst 4002"].—*Tijdschr. Diergeeseks.* **58.** 812-814. [1 ref.]

Having previously discovered that "Höchst 4002" can destroy surra trypanosomes in the blood, [NIESCHULZ, O., & WAHO-ROENTOE, F. K. (1930). *Arch. Schiffs-u. Tropenhyg.* **34.** 662.] the author tested the combined effects of "naganol" and "Höchst 4002" on one experimental case of equine surra. Four weeks after infection the animal was treated with 2.28 g. of "naganol" (20 mg. per kg. body weight), given intravenously, and 3.42 g. of "Höchst 4002" (30 mg. per kg. body weight) given intramuscularly ; both doses were repeated two days later. The trypanosomes disappeared from the blood immediately after the first injections and no relapses occurred during the following year.

A dog was also successfully treated by the same method.

MULHEARN, C. R. (1931). **Dressings for Fly-struck Sheep.**—*Agric. Gazette, New South Wales.* 42. 223-234.

Tests on the suitability of a large number of oils as vehicles for blowfly dressings were carried out in 1929 ; this paper deals with tests of several drugs and proprietary preparations.

The qualities desired in a good preparation are :—an ability to kill and remove maggots without injuring the sheep ; non-irritant properties combined with a healing influence on wounds ; and repellent action on flies.

Five types were used :—oily, watery, emulsified, semi-solid and powdery dressings. The use of oily or watery dressings was dictated by the solubility of certain of the preparations.

The following were tested :—phenol in light pale mineral oil [hereinafter referred to as p.m. oil], in whale oil and in water ; Jeyes' cyllin in p.m. oil and in water ; jeysol in p.m. oil and in water ; cresylic acid in p.m. oil ; beechwood creosote in p.m. oil ; kerosene in p.m. oil ; benzine (motor spirit) in p.m. oil ; turpentine in p.m. oil ; eucalyptus in p.m. oil ; copper carbonate in p.m. oil ; ol. chenopodii in whale oil and p.m. oil ; xylol in p.m. oil ; formalin in water ; aniline in p.m. oil ; oil of citronella in p.m. oil ; carbon tetrachloride in whale oil ; zinc sulphate in water ; zinc sulphate and carbon tetrachloride in oily emulsion ; zinc oleostearate in whale oil ; benzol pure and in p.m. oil ; arsenic dressing 0·5 per cent ; arsenic in sodium carbonate in emulsion with equal parts of p.m. oil and water ; and monsol in water and in whale oil. In addition, three proprietary preparations (names of firms not given) were tested.

The author concluded that the best dressing was 5 per cent. monsol in water ; it has all the required properties of a good dressing. The best oily dressing is composed of 4 per cent. phenol crystals in whale oil with the addition of either 5 per cent. carbon tetrachloride or 2·4 per cent. ol. chenopodii as a repellent. A 5 per cent. aqueous solution of zinc sulphate is also efficient. Benzol is unequalled for killing maggots, but it is an irritant.

LAMSON, P. D., BROWN, H. W., ROBBINS,, B. H., & WARD, C. B. (1931). **Field Treatments of Ascariasis, Ancylostomiasis, and Trichuriasis with Hexylresorcinol.**—*Amer. J. Hyg.* 13. 803-822. 13 tables. [32 refs.]

ANNOTATION. (1931). **Another Anthelmintic.**—*Lancet.* 221. 32-33.

The use of carbon tetrachloride has occasionally produced bad results through its initial stimulating action on ascarids which induces them to migrate. In some instances this has caused a fatal impaction of the bowel or has led to asphyxia through the crowding of a mass of ascarids in the pharynx. In the hope of finding a safer anthelmintic for general distribution in infected areas, several drugs were tried and of these hexylresorcinol appears to be the most suitable. The use of this drug in the full anthelmintic dose of 1 g. for human beings leaves a large margin of safety. LEONARD, who made a study of its bactericidal action took as much as 3 g. daily over a period of ten weeks without showing symptoms of intoxication. The drug has been given to 1,500 affected human beings, including several women in various stages of pregnancy, without causing any untoward results.

One dog which received a dose of 1 g. daily over a period of 105 days showed no symptoms and gained 2 kg. in weight.

The anthelmintic efficiency of hexylresorcinol on the human subject was tested by an egg counting method and it was found that the full therapeutic dose of 1 g. removed on an average 90 per cent. of ascaris, 85 per cent. of hookworms and 55 per cent. of trichuris. As it combines very readily with proteins, its efficiency is greatly reduced if food is taken shortly before or after administration and a fast of ten to twelve hours before, and of four to five hours after dosage is advised. Because of its innocuous nature, a full purge is not required immediately after treatment.

In the annotation in the *Lancet* the opinion is expressed that hexylresorcinol is unlikely to displace other drugs by reason of greater potency, particularly in view of the great reduction in its efficiency when food is present in the alimentary canal.

[According to the price list of a well known drug supply company, 100 doses of carbon tetrachloride cost about fourpence, 100 doses of oil of chenopodium about four shillings and 100 doses of hexylresorcinol over £6.]

HALL, M. C., & COTTON, W. E. (1931). Copper Sulphate Sprays on Pastures for the Control of Worm Parasites of Livestock.—*North Amer. Vet.* 12. No. 8. 31-35.

Preliminary tests carried out by SCHWARTZ in 1928 showed that the first and second stage larvæ of *Strongylus spp.* are killed by immersion in a 1 per cent. solution of copper sulphate overnight and that infective larvæ are usually inactive after the same period. It is, therefore, possible that some beneficial result might follow the application of the solution to ground carrying *Hæmonchus contortus* infection. The experiments here recorded were carried out to ascertain whether there was any danger of poisoning animals by placing them on freshly treated pastures. Two horses, two sheep and two cows were placed on plots of pasture which were sprayed 13 times in three months with a 1 per cent. solution of copper sulphate. No harm resulted either to the stock or to the pasture.

In a further test undertaken by COOPER CURTICE, Bordeaux mixture was used in error. This killed the grass and killed most of the sheep.

POISONS AND POISONING.

STENT, S. M. (1931). Some Poisonous Plants of Southern Rhodesia.—*Rhod. Agric. J.* 28. 811-821.

A descriptive botanical paper recording plants known to be poisonous, or suspected of being poisonous, in Southern Rhodesia. In some cases the information is obtained by botanical identification of plants definitely proved toxic in animal experiments conducted elsewhere (e.g. Onderstepoort, Union of S. Africa). In other cases plants are recorded as suspect on the grounds that many of their "botanically near relatives" have been proved toxic.

The Rhodesian plants are recorded in families and species, with brief descriptions of the chief characteristic of each family.

Amongst the Oleander family, the "Ceylon Rose," *Nerium oleander*, is poisonous in all its parts. *Acokanthera venenata* or "Bushman's Poison," is recorded from Matabeleland.

Amongst the sunflower family several are poisonous to stock, e.g. *Dimorphotheca spectabilis* ("bietou" of South Africa). *Dimorphotheca Zeyheri*, *Geigeria passerinoides*, *Geigeria Zeyheri* ("Vermeersiekte bossies"), *Pteronia pallens* ("Witgat bossie"), *Senecio latifolius*, *Matricaria nigellæfolia*. [Cp. ANDREWS. (1923). Bovine Staggers or Pushing Disease of Cattle occasioned by *Matricaria*. 9th & 10th Reports, Director of Veterinary Education and Research, Union of S. Africa. For "vermeersiekte," or "vomiting disease of Sheep" occasioned by *Geigarias*, cp. DU TORT. (1928). 13th & 14th Reports, Director of Veterinary Education and Research, Union of S. Africa, pp. 107-154]. Six or seven species of *Geigeria* are recorded from Southern Rhodesia, some poisonous and others suspect.

Amongst the "poison leaf" family ("giftblaar" of the Dutch) *Dichapetalum cymosum* is recorded from Matabeleland near Bulawayo. It is poisonous to all stock, the young leaves of spring time being most dangerous [cp. STEYN. (1928). 13th & 14th Reports, Director of Veterinary Education and Research, Union of S. Africa].

Amongst the "Horse Tail" family, *Equisetum ramossissimum* ("dronk gras" of South Africa) is mentioned as occasioning symptoms of staggers. Amongst the euphorbia family the type with succulent roundish or sharply angled stems is recorded as fairly common in Rhodesia. Amongst the Iris family, the tulps or *Moræa* sp. are known to be the cause of mortality of stock in Southern Rhodesia, but little is known about the species.

Amongst the Lily family, of which *Urginea* sp. constitute common stock poisons in the Transvaal ("slangkop"), are recorded *Gloriosa superba*, *Bowiea volubilis*, and *Ornithoglossum glaucum* (Cape "slangkop").

Amongst the legume family, notorious for the number of poisonous plants it includes, the author records numerous *Crotalaria* sp. ("Rattle Box" plants). She records over 30 indigenous species in Southern Rhodesia and treats most of them with suspicion on the ground that several species have been definitely incriminated in the Union of S. Africa, in Australia and in America. *Abrus precatorius* L. ("lucky bean" or jequirity, containing the toxalbumin *abrin* and well known in India in criminal poisoning of cattle), *Tephrosia vogelii*, and *Dolichos lupiniflorus* (both used as fish poisons), *Cassia obovata* (poisonous but seldom eaten by stock) are described.

Amongst the solanum family she records *Datura stramonium* ("Stink-blaar") as a common weed; *Solanum* sp. ("Apple of Sodom"); *Nicandra physaloides* ("Apple of Peru") as a suspicious weed; *Solanum nigrum* ("black nightshade") as an article of diet which it would be better to discard.

Amongst the *zygophyllaceæ* she records *Tribulus terrestris* ("Devils Thorn" or "Duiveltjes") from Matabeleland—a plant which causes "geel dikkop" in sheep.

Attached to the paper is a note by HOPKINS (Government Plant Pathologist) on three poisonous fungi: *Diplodia zeæ* ("dry rot" of maize, poisonous to cattle feeding over reaped maize lands), *Claviceps paspali* (ergot of paspalum), and *Erysiphe graminis* (mildew of grasses) supposed to impart poisonous properties to hay in which it is included.

TURBET, C. R. (1931). Lantana Poisoning of Cattle in Fiji.—*Agric. J. Fiji.* 4. 24-29. [10 refs].

Describes a disease of cattle which has been known in Fiji for several years. Recent experiments have shown that the cause is the plant *Lantana crocea*, which appears to produce photo-sensitisation. The author compares the disease to lupinosis. Symptoms occur 2-14 days after the cattle have first obtained access to the plant and consist of an initial malaise, moderate fever and intense localised pruritus which causes the animal to rub the affected parts until a serous exudate appears on the surface. The affected parts of the skin soon become devitalised and leathery. The muzzle and eyelids are commonly involved and ulceration of the tongue and dental pad sometimes occurs; the urine is golden brown in colour and contains bile.

The mortality is about 70 per cent. and the illness lasts for 12-20 days.

The *post-mortem* appearances all indicate liver dysfunction; the liver is enlarged, friable and icteric and the gall bladder is enormously distended; the connective tissues are oedematous.

Purgative and stimulant treatment have been found to be of some use. Now that the cause is known, the economic importance of the disease is considerably lessened as its incidence can be reduced.

STEYN, D. G. (1931). Gielsiekte and its Detection in the Field.—*J. S. Afr. Vet. Med. Ass.* 2. 23-26. [2 refs.]

The author considers that "gielsiekte" is hydrocyanic acid poisoning of sheep due to the ingestion of certain wilted grasses. He used "bietou" (*Dimorphotheca spectabilis*), a grass containing a cyanogenetic glucoside, for feeding experiments on rabbits. He fed nine rabbits with amounts varying from 5-20 g. of fresh grass and from 1-4.5 g. of dried grass. The minimum lethal dose of the fresh grass was 7.0 g. and that of the dried grass 1.5 g. Hydrocyanic acid was not detectable in the gastro-intestinal contents of the rabbits unless an amount appreciably greater than the minimum lethal dose had been ingested. The gastro-intestinal contents of animals which have eaten a considerable amount of the plant contain hydrocyanic acid, easily detectable by the sodium picrate paper test; this holds good for several weeks if the material is kept in air-tight containers.

The diagnosis of "gielsiekte" in sheep is thus simplified if stomach contents are obtained immediately after death and packed properly for testing at a later date.

Sulphur [see STEYN. (1931). *17th Rep. Direct. Vet. Ser. & Anim. Indust.*] is used as a prophylactic against poisoning by plants containing cyanogenetic glucosides and its usefulness can be tested by the above plan. If prussic acid is found, the amount of sulphur given has been insufficient.

JUNGHEER, E. (1931). Lecheguilla Fever of Sheep and Goats; a Form of Swellhead in West Texas.—*Cornell Vet.* 21. 227-242. 7 tables. [24 refs.]

After a general review of the literature on "bighead" and similar diseases, the author gives an account of a disease of sheep known as "lecheguilla fever" which occurs in the Trans-Pecos country; it is so-called because the plant *Agave lecheguilla* which grows abundantly in that country is supposed to be the cause of it.

In the hard winter of 1930 at a time when the plant was plentiful, 1,500 cases occurred in

flocks of 30,000 sheep and goats. The symptoms included general indisposition, icterus and dark yellow urine. In some animals there was oedematous swelling of the head; in others the skin was dried up, while in still others the skin was unaltered. The affected animals did not usually show a high temperature. The mortality averaged 60 per cent. The chief *post-mortem* lesions were:—enlargement and bile staining of the liver, distension of the gall bladder, some bile staining of the kidneys and, in some animals, punctiform dark-green surface deposits which were considered to be composed of bile salts. The absence of gross renal lesions differentiated the disease from ictero-haemoglobinuria.

Experimental work was undertaken to test whether:—(1) the condition was infectious and (2) whether feeding on lecheguilla plant could produce the syndrome.

The author and other workers have failed to transmit the disease from affected to healthy animals by any method of artificial infection. The disease developed whether the sheep were fed entirely or only partially on lecheguilla and the plant appeared to have a cumulative effect. It is assumed that the toxic principle has a selective action on the liver. Swelling of the head was never observed in the animals subjected to feeding experiments.

The author compares lecheguilla disease to the group of enzootic liver diseases that have recently been reviewed by VAN ES and others in connection with walking disease of horses. [(1929) *Nebraska Agric. Exp. Res. Bull.* No. 48].

Jaundice is also caused by feeding the plants "sacahuiste" (*Nolina microcarpa*) and "black brush" (*Fluorensia cernua*). ["Geel Dikkop" (S. Africa), "Yellowsis" (Scotland) and "headles" (N. Ireland) appear to be similar to this condition].

D'COSTA, J., & SINGH, B. (1930). **The Toxicity of Sodium Fluosilicate for Domestic Animals.**—*J. Anim. Husb. & Dairying in India.* 4. 139-145. 3 tables. [2 refs.]

In order to test whether sodium fluosilicate used as a dressing on pastures for the destruction of locusts (1 lb. per acre), is dangerous to grazing animals, the authors pastured some buffaloes, bulls, sheep and goats on a field which had been dressed immediately beforehand with the salt. The animals were still healthy after grazing on the pasture for a week.

Five other bulls were given concentrate feeds to which from 5-25 grains of the salt had been added daily; they remained healthy during six days' observation.

Two other bulls were drenched with water containing half a drachm and half an ounce of the salt respectively. Both animals became ill, the former for two days and the latter for nine days after dosage, but both recovered. When these bulls were killed three months later, there were signs of old corrosive gastro-enteritis and petechiae on the spleen.

All the other animals remained in good health in the course of subsequent observation.

TECHNIQUE.

TEMPE, G. (1931). Technique de culture en surface des microbes anaérobies. [**The Technique of obtaining Surface Cultures of Anaerobic Organisms.**]—*C.R. Soc. Biol. Paris.* 107. 1021-1023. [2 refs.]

The author describes a method of obtaining surface cultures of anaerobes by the use of a Petri dish of special pattern in which *B. subtilis* or *B. prodigiosus* are used for the production of the necessary atmospheric requirements. The special modification of the Petri dish employed consists of a lid with a circular furrow about 5 mm. deep, as seen from the outer surface at a distance of about 1 cm. from the edge. This furrow coincides with a corresponding ridge on the inner surface of the lid. The central area inside the ridge in the lid is used for making an agar plate, while the dish itself is used for glucose agar for the anaerobic cultivation.

The glucose agar is first put into the dish and the lid is placed in position. Dishes so prepared are incubated for 24-48 hours in order to remove the water of condensation. This is important as, if moisture is present, confluent colonies will be obtained. The agar in the central area in the lid is sown out with *B. subtilis*, or, preferably, with *B. prodigiosus* as this organism does not sporulate. The bottom half of the dish is inverted over the lid after its glucose agar has been inoculated with the anaerobe. The channel in the lid in which the wall of the bottom half of the dish rests is then filled by means of a pipette with sterile paraffin or vaseline to seal the dish.

On incubation there is rapid growth of the *B. prodigiosus* with absorption of the oxygen and production of carbon dioxide. When the oxygen has all been removed, growth of the bacillus stops and anaërobic conditions are established. A large number of anaërobies have been cultivated in this way and it has been found that they retain their vitality for a long time.

HAUPTMANN, W. (1931). Zur Apparatelosen Oberflächenzüchtung von pathogenen Anaeroben. [The Cultivation of Pathogenic Anaerobes without Special Apparatus].—*Zlb. Bakt. I. (Orig.)*. **121**. 384-398.

The author gives details of a large number of experiments in which FORTNER's method of cultivating anaërobies has been tested out. This method consists essentially in growing two cultures—one an aërope and the other the anaërope—in the two halves of a Petri dish, which is sealed up with some readily applied plastic material after the two halves have been put together.

CRACIUN, E.-C., & SORESCO, A. (1931). Méthode d'isolement rapide des leucocytes vivants pour cultures *in vitro*. [Rapid Method for the Isolation of Living Leucocytes].—*C.R. Soc. Biol. Paris.* **107**. 417-419. [2 refs.]

The authors consider that HAMBERGER's classical technique is cumbrous, but that the following new method allows white blood corpuscles to be separated rapidly from whole blood, saving time and using a much smaller quantity of material ; such isolated leucocytes retain their vitality and are easily cultivated *in vitro*.

Nine c.c. of venous blood (canine) is drawn off and rendered uncoagulable by the addition of 1 c.c. of 0·2 per cent. "heparin" in 0·9 per cent. normal saline solution. (A highly efficient anti-coagulant is essential). After cooling 0·6 c.c. of N/5 acetic acid and 0·4 c.c. of N/5 sodium acetate are added, the whole is shaken and finally neutralised by excess of an equimolar solution of sodium hydrate (neutral red indicator).

After 10 and 50 mins. at incubator and room temperature respectively, acid haemolysis occurs and after centrifugilisation the leucocytes are deposited. Haemolysis at the lower temperature is recommended since cell "shadows" are then reduced to a minimum of 2·6 per cent.

CLIZA, S. (1931). Ueber cystoskopie und intravenöse Pyelographie bei Haustieren. [On Cystoscopy and Intravenous Pyelography in Domesticated Animals].—*Arch. wiss. prakt. Tierhkl.* **63**. 307-317. 1 fig. [21 refs.]

After a brief review of the present-day methods for the examination of the urinary organs in man, the author gives his own experiences. He has found that the laryngoscope of FRESE is well suited for cystoscopy in mares and cows after the bladder has been filled with clear water. Further, it is possible to observe the potency of the ureters when an intravenous injection of "cystochrom" (indigocarmine-hexamethylenetetramin solution) has previously been given. This dye is excreted by the kidneys and its arrival in the bladder is easily visible 15 minutes after the intravenous injection.

Similar results were obtained on anæsthetised bitches by using a small cystoscope. It is necessary to employ a urethrotomy incision for dogs. The technique is described in great detail. Catheterisation of the ureters is only possible in large dogs and bitches.

Pyelography was successfully performed in dogs with the aid of two contrast substances, "pyelognost" ($\text{NaI}, \text{CH}_4\text{ON}_2$) and "uroselectan," which are given intravenously. They are excreted by the kidneys and under X-ray examination appear as opacities where they lie in the kidneys, ureters and bladder. Owing, however, to the very rapid excretion of these drugs and to the strange peristaltic action of the ureters in dogs, good X-ray pictures were not obtained until morphia was substituted for chloral hydrate and pernocton was used as a narcotic. For practical purposes the use of uroselectan, intravenously, followed by X-ray exposure, is an excellent way of diagnosing ureteral obstruction.

TURNER, H. W. (1931). **Handling and Medicating Sheep.**—*Vet. Med.* 26. 359.

This is a note giving practical advice on the restraint and dosage of sheep. The author advocates dosing by means of a stomach tube in preference to drenching. He emphasises as a matter of technique that, at *post-mortem* examinations, the air sinuses of the head should always be examined [presumably for fly larvæ] and also the extreme borders of the lungs for the presence of slight lungworm infestations.

MISCELLANEOUS.

CRAIG, W. B. (1931). **Sheep.**—*Vet. Med.* 26. 310-314.

This is a general paper on the management, feeding and handling of sheep, together with brief descriptions of the commoner sheep diseases. Amongst others to which reference is made are :—foot rot, urinary calculi, pregnancy disease and the various parasitic infestations.

PUBLIC HEALTH.

POPPE. (1931). Die Milch als Überträger von Krankheitserregern. [**Milk as the Carrier of Pathogenic Organisms**.]—*Deuts. tierärztl. Wschr.* 34. 324-328.

Discusses the 1930 Act of the German Reich, which is designed to prevent human beings from becoming infected with tuberculosis and foot and mouth disease by milk. The author also discusses the other infections which are transmissible by milk to human beings. These include :—various members of the salmonella group, *Br. abortus*, mastitis streptococci, *B. typhosus*, cholera, *B. coli*, diphtheria, scarlet fever and measles. The author considers that compulsory pasteurisation of all grades of milk by exposure for 30 minutes at 63-65° C. would be the most suitable means for the attainment of this object.

REPORTS.

—. (1931). **Report of the 5th Session of the Committee of the Office international des Epizooties.** (Held at Paris, March 12th-18th, 1931).—*Bull. Off. internat. Epiz.* 5. 1-280.

Twenty-seven delegates from different countries attended this meeting and seven papers of major importance on foot and mouth disease, swine fever, tuberculosis prophylaxis, brucelloses and rabies were presented and discussed; resolutions relating to the control of these diseases were formulated and passed. [Abstracts of the papers are dealt with separately in this *Bulletin*]. Proposals regarding the standardisation of sanitary bulletins (disease statistics) were also made and approved.

The delegates from certain countries furnished reports dealing with the incidence of rabies and foot and mouth disease and a discussion was held on appropriate measures for dealing with the growing sale of secret remedies against the latter disease. Finally, a list of subjects together with reporters was approved for the next meeting of the Office. The subjects cover :—foot and mouth disease, swine fever, tuberculosis, brucelloses, disinfection of means of transport and of animal products, bovine mastitis and bacillary white diarrhoea.

—. (1931). **Report of the New York State Veterinary College at Cornell University for the year 1929-1930.**—*Legislative Document (1931)* No. 18, State of New York.

This report gives a detailed account of the activities of the College and its staff for the academic year. There is a list of the staff and a full list of all public lectures and published papers they have produced, together with a summary of the work of each department. In the latter, it is interesting to note that the physiological department under Dr. FISH has been doing valuable groundwork on the constituents of normal blood as well as on the haematology of several diseases. Dr. MILKS of the Department of Materia Medica has published a new book on Pharmacology & Therapeutics.

In the Surgical Department under Dr. FROST, *Br. abortus* infection in fistulous withers in horses has been investigated ; work has also been done on rickets and osteomalacia. Calcium and phosphorus therapy is stated to have been valuable in the cure of spavin and ringbone.

The Department of Medicine under Dr. UDALL has concerned itself with a wide variety of diseases, chiefly cattle diseases and diseases of the new born. A very large amount of material is available in the ambulatory clinic which is attached to this department, no less than 6,000 cattle cases alone being seen during the year.

Mastitis has been studied under farm conditions with laboratory aid and the workers claim that they can now, by good diagnostic methods, survey a dairy herd and give the owner a definite opinion on its present and future milking efficiency. The Department of Bacteriology and Pathology under Dr. HAGAN has been handicapped by insufficient accommodation, so that the student class had to be divided and taken in sections—a method involving heavy work on the part of the staff. As regards research, three main subjects were investigated namely :—poultry diseases (*B. pullorum* infection, *Br. abortus* infection, chicken pox and a new pigeon disease), Johne's disease and tuberculin reactions. Johnin has been found satisfactory for the former ; skin lesions of cattle reacting to tuberculosis have frequently been found to be caused by acid-fast bacilli other than *B. tuberculosis*.

Much research work on swine fever has also been done ; this has included a study of different pathogenic viruses in symbiosis with the swine fever virus, carried out with a view to the production of attenuation.

2,000 cattle have been under observation for contagious abortion. Good results in control have been obtained in one herd in which supervision was started three years ago.

It is estimated that 20 per cent. of the cattle in the U.S.A. are infected by *Br. abortus* and that the breeding efficiency of infected herds is 51 per cent. as against 82 per cent. in healthy cattle.

The library contains 9,500 books and is the most complete of its kind in the country.

Statistics of cases treated in the three clinics of the College are given ; the diagnostic laboratory also publishes statistics and Dr. BRUNETT of the poultry disease department gives a short summary of work done. The work of this department is growing in importance at a great rate.

Most of the report is devoted to scientific papers which are abstracted elsewhere in this *Bulletin*.

GOVERNMENT OF INDIA. (1931). **Annual Report of the Imperial Institute of Veterinary Research Muktesar, 1929-30.** [WARE, F.] 39 pp. Calcutta : Govt. of India Central Publicn. Branch. [2s. 3d.] [8vo.]

The report consists of three parts :—(1) the report of the Director ; (2) the report of the Veterinary Research Officer, Muktesar and (3) the report of the Deputy Director, Imperial Serum Institute, Izatnagar [branch laboratory on the plains used chiefly for serum production]. Six appendices are also given consisting of tables showing the amounts of the various biological products manufactured and issued, the results of field inoculations with these products, lists of specimens examined, financial details and the prices of the various products.

ADMINISTRATION.—The Director of the Institute has now been declared the head of a department in the Department of Education, Health and Lands, Government of India, an improvement on the previous position according to which the Institute came under the Agricultural Adviser to the Government of India.

Within the Institute there have been certain rather extensive changes in the organisation. The new status of the Director and the formation of the Imperial Council of Agricultural Research have been responsible for increased calls on the services of the Director in the course of which he has to be away from headquarters to a greater extent. A post of first veterinary research officer, Muktesar has been created so that, in the director's absence, the general routine duties will be properly controlled. Similarly, the officer-in-charge, Izatnagar, has been made a deputy director.

FINANCE.—The expenditure for the year was Rs. 7,77,320 and the income amounted to Rs. 15,60,236 representing a gross profit of Rs. 7,82,916. The prices charged for certain of the products is to receive consideration and may be reduced.

There is difficulty in obtaining an adequate supply of hay locally as in the past.

2,033 Himalayan hill bulls, 16 horses, 230 sheep and 666 goats were obtained for the experi-

mental work. There is a small local demand for discontinued cattle and buffaloes.

208 acres of ground on the estate are under cultivation. At present the work is carried on at a loss, but as the land improves the loss will be eliminated and there are advantages in cultivation since fodder is produced which is otherwise not available locally and an outlet is provided for the large quantities of manure that are available and have to be disposed of for sanitary reasons.

The small dairy run to provide milk for the station incurred a slight loss during the year.

Over three million gallons of water for the use of the station were pumped from the deep valley below. The water supply is insufficient and schemes for improving it are under discussion. As soon as the water supply is sufficient a water-carriage system of house drainage will be installed.

LIBRARY.—175 periodicals are taken in and 87 new text books were obtained during the year.

INSTRUCTION.—An advanced post-graduate course is held once every two years. Officers of the department, however, attend the laboratory at other times for practical instruction in certain branches of the routine work.

RESEARCH.

RINDERPEST.—Two strains of goat virus, maintained by direct passage from goat to goat and by alternate passage in goats and in hill bulls, appeared to maintain a constant degree of virulence for cattle which was much below that of hill bull virus.

Three cross-bred calves immunised three years previously by the serum-simultaneous method were solidly immune; two cross-bred cattle, immunised as young calves with goat virus, were immune after 12 months and two were immune after 18 months [extent of isolation in the intervals not stated].

Small preliminary experiments, designed to study the spread of infection by contact by placing susceptible animals along with others passing through severe rinderpest reactions, indicated that natural infection by contact is much slower than had been expected.

Hill bull virus was found to vary in virulence in the form of waves of exaltation and depression, a virus that had apparently become attenuated, regaining full virulence in the course of continued passage.

Experiments were carried out with a vaccine prepared from lymphoid tissue taken from cattle at the height of the reaction and treated with chloroform according to the method described by KELSER (1928). Such vaccine, injected four days after preparation, gave a perfect result in one instance; in other experiments somewhat indifferent results were obtained. The results were considered to indicate that the vaccine as prepared is definitely infective and that any immunity set up depends upon this property. Serum prepared from the vaccinated animals did not possess any protective value.

JOHNE'S DISEASE.—A strain of the bacillus was isolated from natural cases and tests of diagnostic agents were carried out. Attempts were made to infect guinea pigs and rabbits. A large scale experiment carried out to ascertain the vaccinating relationship between the bacillus of Johne's disease and the avian type of tubercle bacillus was completed, but "owing to a surprising decrease in virulence of the culture of the avian tubercle bacillus used for test purposes, no conclusions could be arrived at."

BOVINE HÆMATURIA.—Four cases were observed in Himalayan hill bulls.

B. Subtilis-Mesentericus GROUP.—Strains of an organism spoken of for some years as *Bacillus X*—which can be isolated from horses affected with catarrhal conditions related to shipping, concentration in camps, etc., were found to fall within the *B. subtilis-mesentericus* group. Agglutination tests, with serum from animals in a military remount dépôt affected with "paddock fever" failed to show any relationship between the condition and the *Bacillus X* strains.

NEWCASTLE DISEASE.—Work covered by the report made by COOPER on the so-called "Ranikhet-disease" to the World's Poultry Congress (1930) is discussed.

MISCELLANEOUS.—Work was carried out in connection with many subjects including anthrax, blackquarter, bovine abortion, strangles, glanders, "kumri," bovine theileriasis, certain goat diseases, helminthology and entomology.

PRODUCTION.—22 biological products are dealt with. The following are the numbers of doses prepared of the more important ones:—anti-rinderpest serum, 5,771,254; anti-anthrax serum, 67,141;

haemorrhagic-septicæmia serum, 540, 618; haemorrhagic septicæmia vaccine, 257,200; blackquarter serum, 84,080; blackquarter aggressin, 203,450; mallein, 17,194; rinderpest goat virus, 196 ampoules (15 c.c. each); and rinderpest bull virus, 21,095 c.c.

RESULTS OF INOCULATIONS.—The results obtained throughout India were as follows:—

	No. of Outbreaks in which inoculations were undertaken.	No. of Animals which died uninoculated during outbreaks.	No. of Animals inoculated.	No. of Animals which died after inoculation.
Rinderpest ...	8,772	135,241	1,189,151	5,303
Hæm. Sept. Serum....	2,500	15,868	453,580	736
Hæm. Sept. Vaccine	1,268	56	214,719	12
Vaccine Blackquarter	1,242	5,080	180,949	53
Anthrax ...	127	1,253	16,231	30

NIGERIA, NORTHERN PROVINCES. (1931). Annual Report of the Veterinary Department for the year 1929. [HENDERSON, W. H.] 84 pp. 13 plates. Lagos. Govt. Printer. [fcp.]

The report of the Chief Veterinary Officer occupies 45 pages and the remainder of the report deals with the work of the Veterinary Pathologist [HALL, G. Norman] [See this *Bulletin*, 1. 259].

STAFF.—Mr. J. A. GRIFFITHS, late Chief Veterinary Officer, Nyasaland, took over the post of Deputy Chief Veterinary Officer. Consequent on Mr. KEARNEY being invalided, Mr. G. N. HALL was appointed veterinary pathologist. The post of Assistant Veterinary Pathologist was vacant, but was filled temporarily by Mr. BEADON.

HEADQUARTERS.—The headquarters of the department were moved during the year from Zaria to Vom and now occupy rooms in the laboratory buildings. It is anticipated that, although there is sufficient accommodation at present, when the work of the department expands in the future it will be necessary to obtain other quarters.

LIVESTOCK RETURNS.—There were 196,001 horses, 5 mules, 547,705 donkeys, 2,752 camels, 2,973,452 cattle, 1,722,644 sheep, 5,035,523 goats, 50,176 swine and 44 ostriches. The number of cattle slaughtered annually at markets in the Northern Provinces is being investigated.

GENERAL.—The report is divided into four main sections dealing with the diseases of cattle, horses, sheep and goats and of dogs respectively. In addition the work of the Stock Farm is described.

DISEASES OF CATTLE.

RINDERPEST.—Apart from an outbreak in the Sokoto Province in which 20,000 cattle died, there has been a decrease in the incidence of the disease. The department carries out serum-simultaneous inoculation of the cattle on a large scale. It establishes inoculation camps at suitable centres to suit the migrations of the cattle in the wet and dry seasons. 165,000 cattle were immunised during the year. In herds free from infection at the time of inoculation, the total mortality from all causes was 3 per cent.; in infected herds, it was anything up to 20 per cent. The deaths in the inoculated cattle were mostly due to trypanosomiasis or redwater.

RINDERPEST FIELD RESEARCH.—Spleen vaccine has been tested. At a dose of 5 g. of original spleen tissue per animal, the spleen of a young animal yielding 350 g. of usable spleen tissue will provide enough vaccine for 70 animals. The use of the vaccine together with a dose of serum has been tried. In each case a dose of virulent blood is given a fortnight later. The vaccine serum-simultaneous inoculation has also been used to deal with actual outbreaks of disease with good results in cases where infection had not reached an advanced stage before inoculation was carried out.

Anti-rinderpest serum was prepared from animals which had recovered from natural infection and was used with good results.

CONTAGIOUS BOVINE PLEURO-PNEUMONIA.—The supply of vaccine failed owing to loss of the culture strain. The disease was present in all provinces and in the Borna Emirate alone about 9,000 cattle were reported to have died. The immediate mortality in all outbreaks was about 90 per cent. of the total herd. As in the case of rinderpest, cattle coming in from adjoining French

territory are blamed for the introduction of a considerable amount of infection. The introduction of cattle from outside requires control.

Large scale vaccination is the best method of controlling the disease under Nigerian conditions and it must be carried out at least a couple of months before the cattle are likely to come in contact with infection.

The production of a safe vaccine has been a matter of some difficulty in Nigeria as either the local strain of the disease is particularly virulent or the indigenous cattle are unusually susceptible.

BOVINE TRYPANOSOMIASIS.—The position is about the same as in former years and it is unlikely to change until the tsetse fly menace has been combatted or the cattle owner ceases to take his cattle into known "fly" areas. The situation of the grazing areas at some seasons, however, has given rise to the present customs.

The disease "Modu" which is characterised by earth eating is, at least, closely related to trypanosomiasis. It is, however, apparently confined to certain districts and does not invariably accompany trypanosomiasis—e.g. it has never been seen in infected cattle in the Plateau Province. The Director suspects that it is related to a mineral deficiency, but that the trypanosome infection is also an essential factor. Pasture and soil samples from localities in which the disease occurs were analysed by the Onderstepoort Laboratory, South Africa and Dr. DU TOIT reported that the percentage of phosphorus was so exceedingly low in the case of a pasture sample that, "as a matter of fact it would be difficult to find grass anywhere in the world with a lower phosphorus content." The calcium percentage was also low. The fact that the disease is more prevalent towards the latter end of the wet season is against the theory that a mineral deficiency is the primary cause of the disease. In South Africa, the effects of mineral deficiency are felt more particularly in the dry season of the year when the mineral content of the grasses is at its lowest. Dr. Du Toit pointed out that the incidence in the wet season, the short duration—3-10 days—and the symptomatology suggest an infectious disease. Lack of minerals would, however, be quite likely to aggravate an infective condition.

ANAPLASMOSIS.—Has never been definitely observed in Nigeria.

PIROPLASMOSIS.—Was only observed as a concomitant of the rinderpest reaction in inoculated animals. The effect of injection of a dose of trypan blue into virus producers, 24 hours before they were bled for virus, was tested.

HÆMORRHAGIC SEPTICÆMIA.—Only sporadic cases occur.

FOOT AND MOUTH DISEASE.—Was diagnosed for the first time in Nigeria during the year and was prevalent in the Plateau Province and, to a smaller extent, elsewhere.

BLACK QUARTER.—Causes considerable loss. It was particularly prevalent in the year under report; in some herds there was a heavy mortality and it is said that cattle of all ages were affected. With the development of laboratory facilities, vaccination will be carried out. In the course of preliminary inoculations, satisfactory results were obtained with formolised culture.

ANTHRAX.—Was diagnosed for the first time in cattle in Nigeria. The extent to which it occurs is not known, but the department has no reason to believe that it is prevalent.

STREPTOTHERICOSIS causes serious losses at times.

TUBERCULOSIS.—Is present in a herd containing imported cattle in the Cameroons.

DISEASES OF EQUINES.

"The only disease of equines deserving of any special notice in this section is trypanosomiasis and that only in so far as concerns the curative treatment."

EPIZOOTIC LYMPHANGITIS.—Occurs to a limited extent.

DISEASES OF SHEEP AND GOATS.

CONTAGIOUS PLEURO-PNEUMONIA OF GOATS.—Causes considerable loss, but only a small proportion of the outbreaks are reported.

RINDERPEST in Nigeria is discussed by HALL [see this *Bulletin*. 1. 213]. The use of goats as virus producers is discussed.

SKIN DISEASE OF GOATS is of great importance in connection with the export trade in skins. The subject requires investigation. The department is paying attention to the industrial side

of the question and is organising means for the marketing of skins in such a way as to obtain the prices paid for those of the best quality. At present, indifferent means of preparing skins are responsible for heavy financial losses to the country.

DISEASES OF DOGS.

RABIES.—Three cases of rabies were reported. Anti-rabic treatment of persons bitten by infected dogs is now available in Nigeria.

ANIMAL HUSBANDRY.

The operations of the stock farm are described. Certain feeding experiments with cotton seed and guinea corn and also experiments on the value of bone meal were carried out.

Observations are being made on the breeding of Nigerian dwarf pagan cattle and of long-woollen sheep.

There are 13 photographs relating to various subjects discussed in the report.

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